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Cross Creek Watershed Project
Washington County, Pennsylvania

FINAL ENVIRONMENTAL STATEMENT

Kenneth E. Grant, Administrator
Soil Conservation Service

Sponsoring Local Organizations

Washington County Conservation District
Court House, Washington, Pennsylvania 15301

Washington County Commissioners
Court House, Washington, Pennsylvania 15301

Cross Creek Township Supervisors
R. D. #2, Avella, Pennsylvania 15312

Independence Township Municipal Authority
R. D. #3, Avella, Pennsylvania 15312

December 1973

PREPARED BY

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
Washington, D. C. 20250

USDA ENVIRONMENTAL STATEMENT

Cross Creek Watershed Project

Washington County

Pennsylvania

Prepared in accordance with
Sec. 102(2) (C) of P. L. 91-190

Summary Sheet

I. Final

II. Soil Conservation Service

III. Administrative

IV. Description of project, purpose and action.

A watershed protection and flood prevention project for the 35,000 acres (54.8 square miles) of the Cross Creek Watershed in Washington County, Pennsylvania, will be installed by the local sponsoring organizations with federal assistance under Public Law 83-566, as amended.

Land treatment measures will be applied to 14,800 acres to control erosion and reduce stream sedimentation. Four dams will be built to provide flood protection from a 100-year frequency storm. One dam will also create a 228-acre recreation lake and store 54 million gallons of water for municipal use. Recreation facilities will be established at the recreation lake which will form the nucleus of a 3,500-acre county park.

V. Summary of environmental impact and adverse environmental effects.

Reduce flood damages by 92 percent.
Provide facilities for 150,000 visitor days of recreation use annually.
Reduce soil erosion by 27 percent.
Reduce sediment yield from the watershed by 46 percent.
Provide adequate water supply for present population plus supplies for an additional 500 families and industrial growth.
Periodically flood 168 acres behind the dams.
Temporarily impair stream quality and fishery below the sites during construction.

Permanently improve water quality and fishery at and below each site through the reduction of turbidity due to sediment.
Fish passage will be restricted at four dams.
Periods of aquatic growth may occur in the reservoirs.
Commit 310 acres to dams, spillways and lakes.
Establish a 228-acre recreation lake and a 3,500-acre county park.
Improve wildlife habitat, retard runoff, and improve the hydrologic condition of the watershed.
Stimulate industrial and commercial growth, and provide job opportunities.
Restrict coal mining from under the dam and reservoir sites.
Increase noise, traffic volume and road maintenance especially in areas surrounding the park.
Approximately 14,370 feet of stream will be inundated or covered by the dams, sediment pools, or other permanent impoundments; 8,500 feet will be temporarily affected.
A total of 244 acres will create warm-water fisheries.
Some pollution due to dust and burning will occur during the construction period.

VI. List of alternatives considered

A. Land treatment only.
B. Land treatment and acquisition of flood plain properties.
C. Land treatment, flood plain zoning, floodproofing, and flood insurance.
D. Land treatment and recreation only.
E. Land treatment and water supply only.
F. No project.

VII. Comments have been received from the following agencies and other sources.

A. Southwestern Pennsylvania Regional Planning Commission (Regional Clearing House).
B. State Conservation Commission of the Pennsylvania Department of Environmental Resources. (Governor's designated agency for reviews and approval of PL-566 projects.)
C. Pennsylvania Office of State Planning and Development (State Clearing House).
D. Department of the Interior.
E. Environmental Protection Agency.
F. Department of Health, Education and Welfare.
G. Department of Commerce.
H. Department of the Army.
I. Department of Transportation.

VIII. Final Statement transmitted to CEQ on December 28, 1973.
Draft Statement received by CEQ on May 25, 1973.

USDA SOIL CONSERVATION SERVICE ENVIRONMENTAL STATEMENT

Title of Statement: Cross Creek Watershed Project
Washington County, Pennsylvania

Type of Statement: Draft ( ) Final (X)

Date: October 1973

Type of Action: Administrative (X)

Statement:

1. Description

Authority for Project: Federal assistance through P. L. 566, 83rd Congress, 68 Stat. 666, as amended.

Sponsoring Local Organizations: Sponsors of the project are: Washington County Conservation District, Washington County Commissioners, Cross Creek Township Supervisors, Independence Township Municipal Authority.

Purpose of Project: The project will provide watershed protection, flood prevention, water supply, and recreation to the Cross Creek Watershed.

Project Measure: The project plan provides for conservation land treatment measures and four flood prevention dams. One of the dams will also furnish municipal water supply and create a recreation lake that will be the nucleus of a county park.

Environmental Setting:

Physical Data: The project area is located in northwestern Washington County and consists of 35,000 acres (54.8 square miles). It is drained by Cross Creek above its confluence with a tributary which forms in Coal Hollow near the West Virginia line. Cross Creek Watershed lies in the Pittsburgh-Wheeling-Beaver Subregion (05 03) of the Ohio Region (05) designated by the U. S. Water Resources Council. Pittsburgh and Washington, Pennsylvania; Wheeling and Weirton, West Virginia; and Steubenville, Ohio, all lie within 20 miles of the watershed. The largest communities in this rural area are Avella, Brownstown, Cross Creek and Studa. Only 4,400 people reside within the watershed although two million people live within a 50 mile radius.

The watershed is in the Kanawha section of the Pittsburgh Plateau physiographic province which is characterized by a rolling upland surface. Elevations reach their maximum in the northern part of the watershed where they approach 1,400 feet above sea level and their minimum of about 750 feet above sea level in the channel of Cross Creek where it leaves the watershed.

Soils in the watershed are derived from interbedded shale, sandstone, limestone and coal of the Pennsylvania System. They are generally well to moderately well drained and are rated fair for agricultural use.

Extensive mining of the Pittsburgh coal occurs in the western part of the watershed but little mining occurs in the eastern part. Several other coal seams underlie the watershed but they are not presently being mined. Ground water yields meet some of the rural residential demands but will not meet future needs for urban areas.

Precipitation averages 40 inches per year and about 22 inches of rain occurs during the growing season. The average annual temperature is about 51^{o} F. with extremes ranging from -20^{o} F. to 94^{o} F. The average January and July temperatures average about 30^{o} F. and 72^{o} F. respectively. The growing season averages 150 days.

The watershed is classed as rural, with 45 percent cropland, 20 percent pasture, 23 percent forest land and 12 percent idle land, streams, roads, urban and strip mines. There are 450 acres of flood plain consisting of 59 acres of cropland, 67 acres of pasture, 129 acres of forest land, 104 acres of idle land, 83 acres of urban land and 8 acres of mine spoil. There are no identifiable natural (undisturbed) areas in the watershed.

Cross Creek is the major stream of the watershed and flows to its confluence with the Ohio River in West Virginia. The North Fork and South Fork join Cross Creek near Avella. Middle Fork joins the North Fork of Cross Creek about a mile upstream from Avella. There are no large impoundments in the area. Streams of the watershed are all perennial with unmodified, well defined, natural channels.

Water quality in the watershed must be maintained at a high level to provide use for wildlife and a warm water fishery; water supply for domestic and industrial uses; and recreational water for use in boating, fishing and water oriented contact sports. Water may also be used to provide an aesthetic setting, to generate power and to assimilate wastes. Table 1, Appendix C, lists the minimum water quality criteria which has been established by the Pennsylvania Department of Environmental Resources to provide quality water for these uses.

There are 1,000 acres of wetlands within the watershed and they are listed by type and amount as follows:

Wetland Type 1/	Acres
2 - Inland Fresh Meadow	960
5 - Inland Open Fresh Water	40

Economic Data: Land in the watershed is privately owned except for about 3,500 acres which will be developed as a county park. There are 160 farms which average 170 acres in size. Land use is changing from cropland to grassland and farm size is increasing. Many areas are idle but some are being developed for outdoor recreation. Other areas are being purchased by absentee owners for vacation homesites.

Agriculture is important to the general economy and dairy farming is the dominant enterprise. Poultry and beef cattle also contribute to farm income. It is estimated that there are about 2,000 dairy cattle and 600 beef cattle pastured in the watershed. The annual value of agricultural products is estimated to be $700,000. 2/ Crops grown in the project area are generally used to support milk and beef production and are principally corn and grass for hay or pasture. Corn production averages 100 bushels per acre and hay production averages three tons per acre. Agricultural flood plains have yields similar to the uplands except when their yields are reduced by flooding.

Forest stands consist of mixed hardwoods including ash, oak, hickory, black cherry, sugar maple and black walnut. About 30 percent of the stands are of saw timber size and average more than 1,500 board feet per acre. There is a good demand for quality hardwood sawlogs and veneer logs. A fair market exists for blocking and pallets but the pulpwood market is poor.

Agricultural land ranges in value from $300 to $500 per acre. Land in residential development costs up to $1,000 per acre. The value of uplands is usually greater than land in the flood plain.

Four secondary state routes cross the area. Average farm-to-market distance is 15 miles.

1/ Wetland types described in Wetlands of the United States, USDI, Fish and Wildlife Service, Circular 39.

2/ The agricultural products value estimate was prorated on the basis of area from values listed for Washington County, Pa., in the 1971 Pennsylvania Statistical Abstract, Edition 13, Harrisburg, Pa.

The economy of the area is depressed because of the decline in coal mining and unemployment exceeds ten percent which is about double the national average. Most residents are employed outside the watershed by industries located in Washington, Wheeling, Weirton, Steubenville and Pittsburgh. Income per worker ranges from $8,000 to $10,000 per year.1/ There are no industries in the watershed. Census figures indicate that most farms are operated as family farm units and few hired hands are employed.

The Cross Creek Watershed was evaluated during both the Ohio River Basin Comprehensive Survey and The Development of Water Resources in Appalachia Study.

Fish and Wildlife: The quality and quantity of fish and wildlife resources within the watershed are variable and assessed in general terms. The primary game in the watershed is white-tailed deer, cottontail rabbits, gray and fox squirrels, ringneck pheasants, bobwhite quail and ruffed grouse. Muskrat, raccoon and mink are also present.

Cooper (1972)2/ found in electrofishing studies in the streams of Cross Creek Watershed that there were few game fishes. There were a few largemouth and smallmouth bass found at some study areas but no trout. Centrarchids were generally scarce. The relative abundance of fish and wildlife within the watershed and the amount of hunting and fishing pressure are as follows:

1/ Pennsylvania Industrial Census Series, Washington County, Pennsylvania Department of Commerce; page 19.

2/ Biological Survey of Headwater Portion of Cross Creek Watershed in Washington County, Penna. Cooper, E. L., C. C. Wagner and W. C. Kimmel, State College, Pa., 1972.

Item Evaluated	CROSS CREEK	SOUTH FORK CROSS CREEK	NORTH FORK CROSS CREEK	MIDDLE FORK CROSS CREEK
Fish and Wildlife populations				
Deer	L	L	M	L
Rabbits	M	M	M	M
Squirrels	L	L	M	L
Pheasant	S	S	S	S
Quail	L	L	L	L
Grouse	L	L	M	M
Waterfowl	L	L	L	L
Muskrats	H	M	M	M
Raccoon	H	M	M	M
Mink	L	L	L	L
Bass	M	L	L	L
Suckers	M	M	L	M
Fox	L	L	L	L
Hunting and Fishing pressure				
Deer	M	M	H	M
Rabbits	H	H	M	H
Squirrels	M	L	M	M
Pheasant	H	H	M	H
Quail	M	L	L	L
Grouse	M	L	M	M
Waterfowl	L	L	L	L
Muskrat	H	M	M	H
Mink	L	L	L	L
Bass	L	L	L	L
Suckers	L	L	L	L

L = Low

M = Moderate

H = Heavy

S = Population dependent on stocking

Deer harvest records for Washington County (1965-1971) indicate an average annual harvest of about one deer for every 1,200 acres. This figure is also expected to typify the watershed because of its similar ecologic factors. Studies by the Pennsylvania Game Commission of the woodcock population in Washington County are considered to typify the watershed and indicate a small population. Cross Creek Watershed is not considered pheasant range but the Game Commission stocks pheasant in some of the agricultural areas. There is some natural reproduction from the carry-over of these birds but without repeated stocking the species would probably disappear. 1/

Approximately 90 percent of the land in the watershed is open to public hunting although there are no state game lands. The Game Commission has 100 farm game cooperators who provide 3,000 acres for public hunting. Areas open to hunting and fishing in the watershed are:

Stream Reach or Area	Percentage Open to Public Hunting and Fishing	
	Stream	Land
Cross Creek	90	90
South Fork Cross Creek	90	90
North Fork Cross Creek	80	90
Middle Fork Cross Creek	75	80

A special study of Cross Creek and its tributaries was completed in 1972 to gather biological information and to determine what effect the four planned dams would have on aquatic life. 2/ The study revealed that water in the headwater streams is well buffered and ranges in alkalinity from 157 to 232 parts per million (p.p.m.) $CaCO_3$ equivalent. Analyses for pH, acidity, and conductivity were consistent with the high alkalinity values. 2/ The pH values in the unpolluted tributaries range from 6.5 to 8.5. Conductivity and sulfate values show excellent levels of mineral fertility for the growth of aquatic plants and animals. The diurnal range of dissolved oxygen in the streams was wide but all values were within the safe range for warm-water fishes. No dissolved oxygen values below 5.9 p.p.m. were recorded.

Water quality survey data taken during August 1972 list the following values: 2/

1/ Gardner, Ken 1962. Our Changing Pheasant Range, Pennsylvania Game News, Volume 33, No. 10, pp 12-14.

2/ Biological Survey of Headwater Portion of Cross Creek Watershed in Washington County, Pa., Cooper, E. L., C. C. Wagner and W. G. Kimmel, State College, Pa., 1972.

WATER QUALITY SAMPLING DATA - COOPER, AUGUST 1972

Station	pH	Alkalinity (ppm)	Acidity (ppm)	Sulfate (ppm)	Conductivity (Micromhos)	Sample Period - Diurnal Variation Range Air Temp. (F°)	Range Water Temp. (F°)	Range of Dissolved Oxygen ppm	% Sat.
1	8.2	115	5	300	1010	64-80	64-77	8.0-9.8	94-113
2	8.1	172	8	90	525	64-82	65-76	6.7-9.9	79-121
3	7.6	175	9	58	450	62-80	62-73	7.3-10.0	84-118
4	7.6	173	5	47	440	60-74	68-75	6.7-9.6	76-114
5	7.6	180	10	45	445	58-74	68-78	5.9-7.9	67-99
6	7.6	157	5	55	800	60-74	67-70	8.5-9.5	74-109
7	8.1	218	5	55	520	59-77	70-70	5.9-10.0	68-115
8	7.8	220	8	48	460	70-72	70-73	7.0-9.9	80-118
9	7.8	190	8	98	545	72-73	68-72	7.5-10.2	85-120
10	7.7	192	8	45	475	72-81	68-74	8.0-9.5	91-113
11	7.8	217	4	50	510	60-82	70-77	7.1-8.9	82-110
12	7.4	232	5	49	540	62-81	64-74	8.0-8.2	89-95
13	7.7	178	4	45	475	60-80	70-80	6.6-11.0	76-141
14	7.8	174	4	43	425	58-83	68-74	7.0-10.1	80-120
15	7.6	188	5	44	450	59-83	66-75	6.8-9.3	76-113
16	7.4	178	10	50	460	59-80	69-80	6.2-9.7	71-124

WATER QUALITY SAMPLING STATIONS - Cooper, August 1972

Station	Location
1	Cross Creek, two miles west of Avella.
2	Cross Creek, one mile southeast of Avella.
3	Cross Creek, one-half mile above junction with South Fork.
4	Cross Creek, one mile upstream from site PA-661.
5	Cross Creek, 1½ mile upstream from flood pool PA-661.
6	North Fork, one-half mile east of Avella.
7	North Fork, 1.5 mile upstream from confluence with Middle Fork.
8	North Fork, one mile upstream from confluence with first tributary.
9	Tributary to North Fork just upstream from PA-659F.
10	Tributary to North Fork, one mile upstream from flood pool of PA-659F.
11	Middle Fork, just upstream from PA-660.
12	Middle Fork, two miles upstream from flood pool of PA-660.
13	South Fork, one mile downstream from LR 62035 bridge.
14	Tributary to South Fork, just upstream from PA-662.
15	Tributary to South Fork, one-half mile upstream from flood pool, PA-662.
16	South Fork, one mile upstream from LR 62035 bridge.

The following analyses of Cross Creek were provided by the Pennsylvania Department of Health:

Bacteriological Analyses

Station and Location	Date	Total Coliform MPN/100 ml.
1 - 100' Below junction of T-492 and L.R. 62022	12/ 1/65	240,000 +
2 - 200' Below junction of T-488 and L.R. 62022	12/ 1/65	5,400
3 - At bridge, 100' South of junction of L.R. 62022 and T-486	12/ 1/65	9,200
4 - South of L.R. 62022 at bridge on T-480	12/ 1/65	1,700
5 - Bridge on L.R. 62022, West of junction of 62022 and 62035	12/ 1/65	16,000
6 - Bridge on L.R. 62133 North of 62022	12/ 1/65	22,000
7 - 0.25 Mile below Station Number 6	12/ 1/65	9,200
8 - 1000' Above Lerby Lakes below southern tributary at Lake site	12/ 1/65	22,000
8a- 2000' Above Lerby's Lakes	3/10 /66	170
	3/10 /66	490
8b- 1000' Above Lerby's Lakes	6/ 8 /66	78
8c- 1100' Above Lerby's Lakes	6/ 8 /66	240
6 - Bridge on L.R. 62133 near 62022	6/ 8 /66	240 +
8d- 1,200' Above Lerby's Lakes	6/ 8 /66	140
6a- 100' Upstream from bridge	6/ 8 /66	790
6 - Off bridge on L.R. 62133	7/12 /66	170
6 - 100' Above Bridge	7/12 /66	18
8 - 1000' Above Lerby's Lakes	7/12 /66	230
8 - 1100' Above Lerby's Lakes	7/12 /66	230
8 - 1200' Above Lerby's Lakes	7/12 /66	130

Chemical Analyses

Date	12/1/65	12/1/65	3/10/66	6/8/66	7/12/66	7/12/66
Location	Jct. of T-492 and L.R. 62022	1000' Above Lerby Lakes	2000' Above Lerby Lakes	1000' Above Lerby Lakes	Bridge on L.R. 62133 Station #6	1000' Above Lerby Lakes
Color	5	5	5	20	25	15
Odor	0	0	Very faint earthy	Very faint earthy	Faint earthy	Very faint earthy
Turbidity	15	10	10	5	10	5
pH	8.0	8.1	7.9	7.8	7.1	7.4
Alkalinity	-	-	152	182	186	170
Hardness	220	240	-	-	-	-
Chloride	8	13	7	6	11	9
Sulfate	81	81	-	-	-	-
Nitrite	0.01	0.006	0.014	-	-	-
Nitrate	0.7	0.4	0.6	0.2	0.2	0.3
Iron	0.2	0	-	-	-	-
Manganese	0	0	-	-	-	-
Solids,total	-	-	280	-	-	-
Dissolved Oxygen	-	12.5	11.0	7.5	8.0	7.5
Temp. ^{o}F.	40^{o}	36^{o}	46^{o}	59^{o}	61^{o}	61^{o}
ABS	-	-	-	0	0	0
Phosphate	-	-	-	0	0	0
B.O.D.					4.0	1.1
Ammonia					.24	

The invertebrates found in Cross Creek and its tributaries were typical of unpolluted Pennsylvania streams although their diversity is low. This may be due to the turbid water observed in the streams.

Minnows, suckers, and darters were the dominant fish in the surveyed streams. There were very few game fishes although smallmouth bass were present at two of the 16 sampling stations and largemouth bass were found at five stations. Other centrarchids were present but were not numerous and no trout were found. No rare and endangered fish or wildlife species are present in the Cross Creek Watershed.

Recreational Resources: Cross Creek Watershed is located within State Park Planning Area No. 7. 1/ This nine-county area contains the second largest urban area in the state and has a population of more than 2.8 million inhabitants (1968). The area has 93 county and local parks and playgrounds that are available for public recreation. There are 11 county parks near Pittsburgh, 10 state parks, and park facilities on Crooked Creek in Armstrong County (Table 2, Appendix C). These existing facilities are inadequate to meet the demands of this area. Recent studies cite a tremendous outflow of residents from Pittsburgh who are attracted to sites outside of State Planning Area No. 7. 1/

A total demand for 10,540,000 activity days of picnicking is estimated for State Park Planning Area No. 7 by 1980. The Department of Environmental Resources 2/ has assumed the responsibility for meeting 33 percent of this demand but the remainder must be met by county and local parks. The demand for camping by 1980 will be approximately 1,308,000 activity days, of which the state will provide 50 percent of the needs. Demands for swimming, boating, and fishing are estimated to be 30,504,000, 4,333,000, and 2,337,000 activity days, respectively. The state will provide for 12, 5 and 5 percent of these demands respectively.

Analysis of recreation demands indicates a lack of outdoor recreation to the south and west of Pittsburgh. There is a particular need for parks with large impoundments because strip mining has made large unspoiled areas with unpolluted water very difficult to acquire.

The public recreation facilities in Cross Creek Watershed are presently inadequate. Only the few private facilities listed on the next page are available.

1/ Outdoor Recreation Horizons, Pennsylvania Department of Forests and Waters, Commonwealth of Pennsylvania, 1970.

2/ Bureau of Parks within the Pennsylvania Department of Environmental Resources.

Name	Type	Acres
Meadowcroft Village	Camping, Picnicking, Underlying Open Space	552
Camp Agape	Camping and Picnicking	292
Raccoon Creek Sportsmen's Club	Sportsmen's Club with Fishing	47

The influence of pollution on the water quality of existing recreational resources in the watershed is negligible due, in part, to alkaline headwater streams (157 to 232 p.p.m., $CaCO_3$ equivalent).

Acid mine water reaching these streams is quickly neutralized by the highly buffered stream water and appears to have little effect on the biologic community. 1/ Stream reaches which are affected by mine drainage or other pollutants are as follows:

Stream Reach or Area	Miles	Kind of Pollution or Land Use
Cross Creek	3.7	Mine drainage and sewage
North Fork Cross Creek	1.0	Mine drainage

Archeological and Historical Values and Unique Scenic Areas: There are no areas within the Cross Creek Watershed listed in the National Register of Historic Places. The Carnegie Museum has identified areas within sites PA-660 and PA-661 that may have unique archeological or historical value. The National Park Service, United States Department of the Interior, and the Pennsylvania Historical and Museum Commission have been notified of the project.

Background information regarding cultural resources in the watershed has been inventoried and amplified by personal interviews and field studies by professional specialists of George R. Kemp and Associates of Pittsburgh, Pennsylvania. The proposed Cross Creek County Park, centered around the lake created by PA-661, provides an opportunity for the visitor to study geologic resources, natural fauna and flora, and examples of Federalist architecture, covered bridges and historical agriculture methods. The master development plan for Cross Creek County Park, developed by G. R. Kemp and Associates (1970), may be consulted for details on park facilities.

Soil, Water and Plant Management Status: Cropland acreage is decreasing in the Cross Creek Watershed. County-wide, it decreased 23 percent during the period 1964-1969. Cropland is being converted to pasture as farmers take off-farm jobs and

1/ Cooper, et al, 1972

change their operations to reduce labor and capital requirements. Strip mined and spoil areas are reverting to forest as both natural and man-made plantings restore vegetative cover.

During the past six years, efficient use of labor and capital on easily eroded, wet or marginal uplands has improved 14 percent by installing 2,342 acres of stripcropping, 2,175 acres of conservation cropping systems (rotations), and 27,810 feet of subsurface drain. To date, 1,911 acres have been adequately treated and 50 acres of cropland have been converted to grassland. Areas needing drainage or subject to frequent flooding will receive less than one percent of the planned land treatment.

The Washington County Conservation District was organized in February 1948 and carries out a cooperative program of conservation treatment within the watershed. The district is a sponsor of the Penn's Corner Resource Conservation and Development Project application, and is active in the expanding urban area.

As of June 1972, 102 (41 percent) of the 248 operating units in the watershed were cooperating with the conservation district. Ninety conservation plans have been developed and are being implemented to control erosion, manage water and improve cropland, hayland, pasture land, forest land, recreation land and wildlife habitat. Slightly over 52 percent (18,359 acres) of the watershed area is covered by conservation agreements. Conservation plans have been written, with the assistance of the Soil Conservation Service, for 13,505 acres of the watershed and 14 percent (1,911 acres) have already been treated. Practices applied are as follows:

Land Treatment Measure	Unit	Amount Applied As of June 1972
Stripcropping	Acre	2,342
Conservation Cropping System (Rotations)	Acre	2,175
Diversion	Feet	29,065
Subsurface Drain	Feet	27,810
Grassed Waterway or Outlet	Acre	13
Pasture and Hayland Management	Acre	806
Pasture and Hayland Planting	Acre	2,362
Wildlife Upland Habitat Management	Acre	816
Hedgerow Planting	Feet	48,000
Ponds	No.	9
Spring Development	No.	82
Tree Planting	Acre	275
Access Road	Feet	4,400
Heavy Use Area Protection	Acre	3
Recreation Area Improvement	Acre	40
Recreation Trail and Walkway	Feet	10,600

A cost-sharing program has been carried out by the Agricultural Stabilization and Conservation Service to accelerate the establishment of conservation practices in the watershed. About $15,500 has been used each year by landholders. The Cooperative Extension Service of the Pennsylvania State University, through county Agricultural Extension Agents, is assisting with information and education programs to carry out project objectives. Appalachian Land Stabilization and Conservation Program funds have also been used to assist in the installation of 87 acres of perennial cover, 58 acres of pasture and hayland treatment, 18 acres of contour stripcropping and one spring development in the project area.

The Pennsylvania Game Commission has active Safety Zone and Cooperative Farm Game Programs in the watershed. In 1970, this program affected 3,000 acres and 100 cooperators.

New mining operations will fall under the provisions of the 1945 Conservation Act, as amended, which requires operators to carry out reclamation measures. Areas disturbed before the Act are becoming stabilized by natural plant succession and pollutants stemming from erosion of this land are diminishing.

The Cross Creek Gas Storage Field is located just west of PA-659F and there have been numerous gas and oil wells drilled within the watershed. A search of the records of the Bureau of Topographic and Geologic Survey, Pennsylvania Department of Environmental Resources and contact with local oil and gas utilities revealed no known oil or gas wells within the flood pools of the proposed dams.

Water and Related Land Resource Problems

Land Treatment: More than 53 percent (18,800 acres) of Cross Creek Watershed is agricultural land Capability Class III and IV. Conservation treatment is needed on 8,500 acres of this land to maintain production. Erosion problems occur on 32,000 acres of the watershed and wetness is a problem on 2,200 acres.

Soils of the watershed are typically low in fertility and many farms and fields are too small or steep for efficient use of modern equipment. Farming is becoming less intensive because row crop acreage is decreasing and grassland is increasing.

Surface and subsurface mining has disturbed large areas in the lower end of the watershed. Although these areas are partially revegetated, they are poorly suited to development because of their ruggedness. Streams in these areas have a high potential for sediment pollution where disturbed.

Flood Damage: Flooding along Cross Creek is a problem and serious damages occurred in 1912, 1920, 1928, 1954, 1960 and 1963. The greatest damage occurred during the storm of September 1 and 2, 1912 and that has been selected as the key flood for damage

analysis. The flood resulted from thunderstorms which deluged the watershed with four to ten inches of rain over a four-hour period. Soil moisture was below average prior to the storm. The resulting flood was larger than that which would be expected from a flood with a 100-year recurrence interval.

The key flood took the lives of seven people and caused damage to residences, commercial properties, railroads, highways and bridges. Numerous sections of roads and 19 highway bridges were damaged or destroyed by the 1912 flood. The bridges replaced since then are larger but if the key flood reoccurs most of them would be washed out or severely damaged.

During the 1912 flood, railroad embankments washed out. Bridges, tracks, communication lines, switches, buildings, a railroad engine and several freight cars were damaged. The railroad lost the use of this main line during the reconstruction period and suffered loss of business and increased costs due to the re-routing of traffic.

If a storm the size of the key flood were to occur today, it would cause damages of $320,000 to 102 residences; $490,000 to commercial establishments; more than $1,000,000 to the railroad; $650,000 to roads and bridges; and it would flood 450 acres.

Flooding restricts the use of 320 acres of agricultural land on the flood plain but only a few farm buildings are inundated. Most agricultural damage results from a decrease in crop and pasture production.

The average annual direct and indirect damages are $15,660 to residences and $28,970 to commercial properties. These properties have a market value in excess of $2,000,000. Damage is concentrated in Avella and Brownstown. Average annual direct and indirect damages to the railroad are $20,360 and occur primarily in Reaches A, B and F (see Appendix D). Average annual damage to roads and bridges amounts to $24,090 and generally occurs in Reach C.

Land along the streams in Reaches A, D, F, F-1 and I experience scour and overwash damage. Crops grown on some of this land are damaged by floodwater and damages to land and crops average $280 annually.

Indirect damages, estimated as a percentage of direct damages, are 10 percent of the agricultural damage, 15 percent of residential damage, 20 percent of industrial and commercial damages and 25 percent of road, bridge and railroad direct damages. These damages include delayed shipment of materials and products, loss of wages to employees, increased costs due to rerouting traffic and interruption of public utilities and similar services.

Erosion Damage: Average annual erosion of the Cross Creek Watershed under present conditions is about 2.6 tons per acre using the Universal soil loss equation for estimation. Soil loss values are:

Land Use	Average Annual Soil Loss Tons Per Acre Range
Cropland	0.1 - 19.0
Grassland	0.04 - 1.8
Forest Land	0.002 - 0.1

Streambank erosion is estimated to be less than 40 tons per mile of stream and gully and roadside erosion is less than 10 tons per square mile. Areas undergoing urbanization are estimated to lose about 15 tons per acre each year. Approximately 200 acres of the watershed located below the proposed sites are mine spoil and erosion from this area is estimated to exceed 15 tons per acre.

Erosion removes plant nutrients, reduces crop yields, detracts from the aesthetic appearance of the land and contributes to stream pollution by increasing sediment accumulation and plant nutrients. The current land treatment program is reducing the erosion rate.

Sediment Damage: Damage to agricultural lands from the deposition of infertile sediment is minor and no swamping damages were noted. Sediment damage to urban areas is intimately associated with floodwater damage. Average annual damage due to sedimentation is estimated to be less than $200 for the entire watershed.

No large water impoundments are located in the project area. The loss of capacity due to sediment accumulation in small ponds has not materially affected their function. Sediment carried in streams contributes to the overall turbidity and adversely affects fishery resources. Game fish population and diversity are low primarily because of sediment accumulation and high turbidity. 1/

No sediment gaging stations have been established in the watershed but the average annual sediment yield at the watershed mouth is estimated, from studies of the drainage areas of the proposed sites, to be less than 200 tons per square mile (136 p.p.m.).

1/ Cooper, et al, 1972

Municipal and Industrial Water: Water supply systems service the communities of Avella, Brownstown and Studa from surface sources. In the Avella-Brownstown area, there are about 300 customers. Rural residents obtain their water from wells and springs. Present urban supplies are not adequate and available storage cannot be expanded to provide for future demands.

Ground water in the watershed may be obtained from medium-grained sandstone aquifers of Pennsylvanian age. Although a domestic supply of 5-10 gallons per minute is common in the area, there is some possibility for slightly higher yields of about 25 g.p.m. Test wells drilled by the Pennsylvania Department of Health (presently Department of Environmental Resources) in the Avella area had small yields and were reported to be high in chloride.

Independence Township Municipal Authority has indicated a need for expansion of its present water supply system. Their present demands are about 100,000 gallons per day. A consulting firm retained by the Authority anticipates that future demands will be 200,000 gallons per day, based on 200 additional residential customers.

Recreation: Cross Creek Watershed is located in State Park Planning Area No. 7. The population of this area exceeds 2.8 million (1968) and is increasing. By 1980, it is estimated that the recreational demand will be 50,000,000 activity days of swimming, picnicking, boating, fishing and camping. At that time, the supply of state parklands in this area will be short of the demand by more than 14,000 acres. 1/

Pennsylvania State Planning Board statistics 2/ indicate that there are inadequate state and local park facilities within State Planning Region No. 12 3/ surrounding the watershed. This region contains 12,894 acres of state parks (4.5 acres per 1,000 persons). By 1980, the supply is expected to increase to 74,233 acres (23 acres per 1,000 persons). Even this increase will not meet the recreational demands and leave a deficit of nearly 6,600 acres.

Local parks supply 14,222 acres of recreation (4.9 acres per 1,000 persons) and by 1980, the supply will be approximately 39,355 acres (12.2 acres per 1,000 persons). This will leave a 19,146 acre deficit in local parks for the region.

1/ Outdoor Recreation Horizons, Pennsylvania Department of Forests and Waters.

2/ Statewide Outdoor Recreation Plan, Pennsylvania State Planning Board.

3/ State Planning Region No. 12 is now called Uniform State Planning Region No. 10.

There is potential for water-based recreational developments but several water quality factors may cause problems. Studies by Cooper, et al, 1972 , indicate a high level of mineral fertility in the streams which will encourage abundant growths of aquatic plants and animals. These growths may be a nuisance for boating and fishing.

Acid mine drainage also affects parts of Cross Creek and North Fork Cross Creek below the proposed structures.

Fish and Wildlife: Wildlife populations within the watershed are limited. Land use is centered on producing forage crops, grasses and legumes for livestock with a resulting decrease in small grain crops. Large fields of hay and pasture with few borders provide poor habitat and wildlife populations are declining. In addition, 60 percent of the woodland is in pole size timber and relatively unproductive for wildlife. There are only 1,000 acres of wetlands within the watershed and most of this is inland fresh meadow, Type 2 wetland.

A review of existing data shows there are no rare or endangered species of fish or wildlife within the watershed.

Fishery resources in the watershed are adversely affected by sediment, periodic flooding, low flow, and high turbidity. Game fish populations and diversity are low in all tributaries primarily because of high turbidity and sediment accumulation.1/

Surveys by the Pennsylvania Fish Commission indicate that about 200 man days of fishing per mile of stream occur each year on Cross Creek above its confluence with North and Middle Forks.

There is no publicly owned hunting area in the watershed. There are about 15 farm ponds available for private fishing.

Economic and Social: Most of the farmers of the Cross Creek Watershed are employed off their farms; less than 30 percent have full-time operations. Only 5 or 6 farm units use 1½ man-years of hired labor each year, and they hire help during harvest season.

The area is economically depressed due to the decline in both agriculture and coal mining. Markets for small diameter wood are also inadequate. The rate of unemployment in the area presently exceeds ten percent, which is considerably above the state level of unemployment. The watershed lies in a depressed part of the Pittsburgh Labor Market and has an annual per capita income of $2,200. This rate is well below the average ($3,600) for the market area. 2/

1/ Cooper, et al, 1972
2/ Pennsylvania Statistical Abstract, 1971.

Other: Septic tanks are the common method of household sewage disposal in the watershed. There are no public sewage treatment facilities. If untreated sewage entering the drainage system increases, the water quality in Cross Creek could be degraded. Standards for the quality of the waters of Cross Creek have been set by the Pennsylvania Department of Environmental Resources. Washington County health officials have the responsibility to enforce these Standards.

About 2,500 dairy and beef cattle are pastured on farm enterprises in the watershed; feed lots are not used in these enterprises. Manure accumulating at barns and milking parlors is spread on fields.

Pesticides are limitedly used in the Cross Creek Watershed. Federal and state agricultural officials estimate that there are 250-300 pounds of pesticides of all types used each year in the project area.

Planned Project

Land Treatment: Land treatment measures will be installed for both watershed protection and flood prevention. A combination of land treatment practices are required and must be tailor-made to fit the land, topography, use, soil properties and the management ability of the land user.

During the 7-year installation period, land treatment practices will be installed throughout the watershed. Practices installed will include conservation cropping systems (rotations), stripcropping, diversions, waterways, subsurface drains, drainage field ditches, ponds, spring developments, grassland planting and management. The accelerated land treatment program will result in 4,500 acres of cropland and 6,000 acres of grassland being adequately treated.

The Bureau of Forestry of the Pennsylvania Department of Environmental Resources, in cooperation with the U. S. Forest Service, is providing technical assistance to:

a. Install land treatment practices on 1,500 acres of forest land.

b. Prepare forest management plans on 2,800 acres.

c. Stimulate interest in the watershed program, make surveys, and carry on planning, supervision and inspection of the forest resources.

The following practices will be applied to forest land: tree planting, hydrologic cultural operations (weeding, thinning, improvement and harvest cutting), fencing (livestock exclusion), and erosion control on skid trails and logging roads.

Structural Measures: Four dams (three single-purpose flood prevention dams and one multiple-purpose dam (flood prevention, recreation and water supply)) and a recreation facility are planned for Cross Creek Watershed. The dams are designed to provide temporary storage of runoff upstream and then release the water at a rate which will minimize downstream flooding. Flow will be controlled through ungated, self-operating reinforced concrete conduits. The completed project will control floodwaters from 46 percent of the drainage area above Avella.

The dams will be built of earth and rock fill and will have an energy dissipator in their outlet works to reduce the energy of the water before it enters the downstream channel. Each structure will have an earthen emergency spillway (PA-662 has a spillway on each abutment) which will pass flow in excess of detention storage and conduit release. Dams and emergency spillways will be planted with grasses and legumes, and their maintenance program will be managed so as to provide wildlife habitat.

Storage will be provided in the reservoir for the sediment which will accumulate during the life of the project (100 years) to protect the storage provided for other uses. The sediment pools will initially fill with water but will gradually fill with sediment during the life of the reservoir. Sediment trapped in these pools will decrease downstream turbidity.1/

Reservoir PA-661 (multiple-purpose dam) will include water storage for municipal water supply, recreation, and flood prevention. There will also be 898 acre feet of water stored to replace losses from the reservoir due to seepage and evaporation and to maintain riparian flow at the rate required by the Pennsylvania Department of Environmental Resources (.15 cubic feet per second per square mile, c.s.m.).

The Pittsburgh coal is present 75 feet below the flood plain at Site PA-659F, 55 feet at PA-660, 240 feet at PA-661, and 205 feet at PA-662. Mineral rights will be purchased to insure support for all dams and reservoirs. The area was determined by projecting downward and outward from the base of the dam at an angle 30^{0} from the vertical to the level of the mineral. No minerals shall be removed or access entries driven for any mineral which lies within 200 feet of the ground surface. In the areas deeper than 200 feet from the ground surface, 40 percent extraction of the coal will be allowed provided that the remaining 60 percent is left in uniformly distributed pillars. The pillars shall have a minimum width of 30 feet and openings between the pillars shall have a maximum width of 20 feet. A factor of safety of at least 2.5 shall be provided. The factor shall be determined as outlined on page 15 of "Coal Support for Dams - Cross Creek Watershed," by General Analytics, Inc. This publication is on

1/ Marcuson, Pat 1969. Job Completion Report, Montana Fish and Game Department, Project No. F-20-R-13, Job No. 3, Stream Sediment Investigation.

file with the Soil Conservation Service office. If any mining is to be done of minerals which lie greater than 200 feet below the surface, the mining shall be approved by a qualified engineer experienced in mine subsidence problems, the Pennsylvania Department of Environmental Resources, and by the Soil Conservation Service, United States Department of Agriculture.

Surface mining is not anticipated in the drainage area of PA-661 during the life of the structure. A permit for strip mining coal in this area was rejected by the Pennsylvania Department of Environmental Resources in 1972.

Clearing during construction will be limited to the dam, spillway, borrow, permanent impoundment and recreation facility areas. These areas will be revegetated with adapted grasses, legumes, trees, or shrubs where practicable. Areas of the flood pool where occasional impoundment will occur will be restricted from intensive land use and, where suited, will be developed for wildlife habitat.

There will be nine single unit dwellings including five farm operations, a sportsmen's club, three roads, and power telephone and pipe lines relocated from the pool and construction area of the sites.

During the first three years following construction, the dams and facilities will be inspected each year by sponsoring organizations and the Soil Conservation Service. Thereafter, they will be inspected by the sponsors every year and following flooding events which might adversely affect the structures. Repairs will be made as required by the operations and maintenance agreement.

The recreation lake will be protected from sediment or other pollutants from the recreation facilities by inclusion of erosion control measures as part of the facilities and providing adequate sanitary and solid waste disposal measures. Land and water resources to be used for each structure are listed in Table 3, Appendix C.

A recreation facility will be constructed to compliment the recreation pool of the multiple-purpose structure (PA-661). It will have facilities for boating, picnicking, fishing and hiking for a design load of 150,000 visitor days each year. Sanitary facilities for the recreational development will use a concrete vault for temporary storage of waste. This tank will be periodically emptied and the effluent removed for disposal at a sewage treatment plant. Plans exist for the future increase of the recreation facility to a 3,500-acre park. At that time, the vault-type sanitary facility will be converted to a central sewage system.

An erosion and sediment control plan as required by the Pennsylvania Department of Environmental Resources will be developed. Items in the plan will include but will not be limited to the following:

a. Sprinkling will be used to keep dust within acceptable limits.

b. Sanitary facilities will be installed according to the requirements of the Pennsylvania Department of Environmental Resources.

c. Measures will be provided at equipment storage and repair areas to prevent contaminants from reaching streams and ground water.

d. The following erosion and sediment control measures will be applied, as needed, to the area of land which will be exposed.

   (1) Diversions, waterways and terraces will be used to retard the rate of runoff and control runoff from the construction site.

   (2) Debris basins will be used to minimize sediment resulting from construction and dewatering operations.

   (3) Clearing and grubbing of construction site and borrow areas will occur in stages as construction progresses.

   (4) Temporary vegetation and/or mulching will be used to protect the soils. Segments of work will be completed and protected as rapidly as is consistent with construction schedules.

   (5) Conduits or bridges will be installed where construction activities cross flowing streams.

   All operations will be conducted to minimize stream turbidity at and below the structures. Requirements established by the Pennsylvania Department of Environmental Resources will be conformed to during construction.

e. Prior to construction, areas will be designated for the disposal of waste material.

Solid waste generated during both the construction of the dams and operation of recreation facilities will be disposed of in accordance with appropriate state and local regulations. Topsoil, obtained in the construction of the dams and recreation facilities, will be disposed of by using it as top dressing for

borrow and spoil areas or to flatten the downstream toe of the dam. These areas will be reseeded for protection with appropriate grasses, legumes, trees and shrubs to provide stable areas and wildlife habitat. Trees or other cleared materials will be salvaged for merchantable wood products as practicable. Waste products will be burned or buried, depending on the nature of the material, in accordance with applicable regulations or, in some cases, may be used to create brush piles for wildlife habitat.

Wastes from employees during construction of the dam will be disposed of in a manner which will not provide contaminants to the areal ecosystem. Generally, they will be collected in portable containers, removed from the site and processed in a sewage treatment facility. Solid wastes, generated during construction of the project or operation of the park, will be collected and eliminated as part of the management plans for project construction or park operation.

Vector control will be mutually agreed upon by the Soil Conservation Service, local sponsors and the Pennsylvania Department of Environmental Resources.

The sponsors will be encouraged to adopt flood plain management ordinances. The Soil Conservation Service will provide technical assistance if requested. Misuse of the flood plain will be discouraged by the sponsors who will publicize at least once annually those areas which will not receive complete protection from the 100-year flood.

A thorough ground search will be conducted for oil and gas wells during the final geologic investigation of each dam. If any wells are found, they will be sealed.

Contact is being established through the National Park Service and the Pennsylvania Historical and Museum Commission and with Carnegie Museum archeological groups to determine the importance of the archeological sites located at sites PA-660 and PA-661. Salvage archeology studies of these sites will be made where necessary.

The following table shows a breakdown of project costs.

TOTAL PROJECT COSTS (Price Base: 1970)

	PL-566	OTHER	TOTAL
Total Project	1,902,600	2,142,400	4,045,000
Land Treatment	72,000	488,000	560,000
Structural	1,830,600	1,654,400	3,485,000
Construction	(1,393,900)	(522,100)	(1,916,000)
Other (Engineering, Land Rights, Relocation Payments, Project Administration)	(436,700)	(1,132,300)	(1,569,000)

2. Environmental Impact

Flood Prevention, Erosion and Sediment: Discharge from the key flood (1912) through the Avella area was 16,000 c.f.s. The 100-year flood would be 13,000 c.f.s. When the program is completed, the discharge from similar storms will be reduced to 8,000 and 6,000 c.f.s.

There will be 63 residences completely protected from a recurrence of the key flood, although 32 residences would still have basement and/or nuisance type damage. First floor flooding would occur to seven properties and range from just over the floor on four properties to less than one foot on the others. The remaining average annual damage is estimated to be $1,240.

There will be 22 commercial properties completely protected after project installation but first floor damage would occur to five enterprises. The depth of flooding would range from about one foot in four establishments to two feet over the floor of a gas station. Basement and nuisance type damage would occur to 16 properties. The remaining average annual damage is estimated to be $2,530.

Other remaining damages are $1,190 to the railroad; $2,220 to roads and bridges; and $30 to land. The average annual direct and indirect floodwater damages will be reduced 92 percent to $7,210 with the project in place. The complete elimination of damages to urban areas requires a degree of protection that is impractical to attain, both from an economic and engineering standpoint.

There are about 450 acres of land subject to flooding by the key storm. Present land use is 13 percent cropland, 15 percent pasture, 29 percent forest, 23 percent idle, and 20 percent other uses including developed areas. Principal crops grown on the flood plain are for forage (corn, hay, pasture). Installation of the project will protect 210 acres of agricultural flood plain. No new lands are expected to come into agricultural production. The project is expected to induce a change of 45 acres from agricultural to residential use.

Land treatment will help restore and maintain productivity by adding or holding plant nutrients and, where appropriate, changing land to a less intensive use. Degradation of surface waters by agricultural pollutants which are attached to soil particles will be reduced because erosion will be retarded by erosion control practices. Other land treatment practices will be installed which will create wildlife habitat and contribute to the aesthetics of the area. Average annual rates of sheet erosion are expected to be reduced from 2.6 to 1.9 tons per acre by the installed program. Damage to flood plains from sediment and erosion in Reaches A, D, F, F-1 and I will be reduced by almost 90 percent.

A 46 percent reduction in sediment yield from the watershed will also occur due to both the retardation of erosion by the land treatment program and the trapping of sediment behind the proposed dams. The future sediment yield from the watershed is estimated to be 107 tons per square mile (73 p.p.m.), reduced from 200 tons per square mile (137 p.p.m.). This decrease of sediment load will improve water quality in the streams. A decrease in turbidity may allow a more complete utilization of stream nutrients but the amount of these nutrients will decrease because of increased infiltration and decreased erosion.

Stream fishery may be temporarily impaired due to increased turbidity during the construction period of the dams. Sediment and erosion plans for each dam will be implemented which will minimize the impact of these pollutants upon the streams. Some air pollution due to dust or burning may also occur during the construction period of the project.

Average annual floodwater damage will be reduced from $89,360 to $7,210. Of these benefits, $78,930 will accrue to structures and $3,220 to land treatment. Total average annual benefits, including recreation, changed land use, municipal water supply, redevelopment and secondary effects accruing to structural measures and land treatment is $311,600 (see Appendix A).

Average annual damages to agriculture will be reduced by $220 (88 percent) and nonagricultural damages will be reduced by $81,930 (92 percent).

Nonagricultural flood prevention benefits accrue as follows:

	Percentage
Residences	19
Business and Industry	32
Roads and Bridges	26
Railroads	23

Water Supply: The multiple-purpose dam (PA-661) will include 166 acre feet of municipal and industrial water and provide 54 million gallons (200,000 gallons per day for 270 days) to meet current and anticipated needs. This will provide the Independence Water Authority with enough water to service an additional 500 families, and anticipated industrial growth. Average annual benefits from water supply were estimated to be $7,900 (Appendix A).

Fish, Wildlife and Recreation: Construction activities will temporarily produce sediment but action will be taken to minimize the amount entering the stream. Land cleared or disturbed during the installation of the project will be re-vegetated during and after construction. These plantings will reduce the effects of construction on both the disturbed land and the streams and improve wildlife habitat.

The fishery below each impoundment will be improved for fish by a reduction in turbidity, stabilized stream flow and reduced flood damage. Fish passage will be restricted by the four dams; however, the impact will be slight due to the number and species of fish involved. These works of improvement will not affect the wetlands of the watershed.

The following table summarizes the physical effects of the structures on the streams and ambient environment.

	PA-659F	PA-660	PA-661	PA-662	Total
Area of Clearing (Acres)	2	1	50	5	58
Vegetation Affected 1/	WC-W-OA M-AS-H-B	GC	SY-W-BC -BL	W-GC	
Max. Length of Stream Affected by Flood Pool (Miles)	0.34	.49	.46	.32	1.61
Length of Stream Affected by Dam, Sediment Pool and Other Permanent Pools (Feet)	1,220	1,375	10,075	1,700	14,370
Acreage which may be temporarily flooded (Flood pool)	22	49	53	44	168
Acreage of Warm-Water Fishing Created	-	8	228	8	244

1/ WC - Wild Cherry, W - Willow, OA - Oak, BL - Black Locust, M - Maple, AS - Ash, H - Hawthorn, BC - Black Cherry, B - Blackberry, GC - Grassland Community, SY - Sycamore

The installation of the recreation facilities in the park surrounding reservoir PA-661 will ultimately change 3,500 acres of land to recreation use. Vegetation affected by these facilities include stands of Hawthorn, Cherry, Oak, Maple, Ash, Locust, Walnut, Poplar, Beech and grassland communities. Development of these facilities will include reforestation and other conservation measures.

There will be about 435 acres that are restricted from mineral resource development to protect the foundations of the proposed dams and reservoirs. The amount of coal under the dams and reservoir areas is estimated to be 25,000,000 tons. The sponsoring organization estimates the mineral rights for these deposits are $108,800.

The following land use changes are expected to occur during the installation period (seven years) of the project.

Land Use	Present Acres	Acres End of Installation	Net Change
Cropland	15,700	10,700	- 5,000
Grassland	7,000	9,400	+ 2,400
Forest land	8,200	9,500	+ 1,300
Other	4,100	5,400	+ 1,300

Changes in land use and the installation of conservation practices will bring about changes in vegetation which will improve food and cover for wildlife. These land use changes and the ability of the dams to trap sediment will decrease turbidity.

There are no public lands or waters within the watershed for fishing or hunting. The project will provide the nucleus for a 3,500 acre county park and about 250 acres of warm-water fisheries. Temperature of the impounded water will be elevated but only warm-water fishing is presently available. The impoundments may be troubled with aquatic growth due to the high level of mineral fertility of the water. Land treatment measures will retain nutrients in the uplands. Natural flow through the reservoir will change the water several times during the year.

The construction of PA-661 will increase opportunities for water-oriented recreation. The park is expected to draw visitors from within the watershed and surrounding urban areas. The lake and recreational facilities will be used throughout the year. Most picnicking is anticipated during a 14-week summer session. Boating and fishing use will concentrate during a 25-week period. The daily design capacity is 1,200 for picnicking and 900 for boating and fishing. An estimated 150,000 annual visitor days of use is expected.

Archeological, Historical and Scenic: The Carnegie Museum was contacted concerning the loci of archeological sites in the watershed and several locations of potential significance occur in proposed revervoirs PA-660 and PA-661. Contact is being established through the National Park Service with archeological groups to determine the importance of these sites and to excavate and study them where necessary.

The salvaging process, accelerated by project construction, will result in earlier exposure and discovery of archeological points of interest.

An erosion and sediment control plan will need to be developed and implemented. This plan will ensure that sediment production created during archeological investigations will not pollute Cross Creek.

Economic and Social: The flood prevention program will remove a degree of uncertainty and chance for the local employer. This condition will be expressed in the number and quality of job opportunities and increased worker income. An influx of money will result in a real, uninflated increase in the economic base because of the low rate of income and high rate of unemployment in the area. The average annual redevelopment benefits stemming from increased labor use in project construction, operation, and maintenance are $16,600. Because of unemployed labor resources in the area, each added unit of employment is important.

Developed areas that are protected from flooding will have fewer dangers of drowning, disease, fire and pollution. Individuals protected will have financial resources available to them for other than flood damage repairs. These resources can allow an upgrading of living standards or working conditions in cases of protected commercial engerprises. The conditions will be augmented by a feeling of security and peace of mind which the flood prevention project promotes.

Secondary effects will be the elimination of interruptions in transportation and other public facilities due to flooding. Debris which is deposited in stream channels and at bridges will be retained behind structures which control 40 percent of the watershed. The elimination of flooding will reduce time and wages lost during cleanup operations.

The proposed park will provide an opportunity for supportive enterprises to develop. Job opportunities and other economic benefits will result from commercial growth on private land surrounding the park. These benefits will be accompanied by increased traffic to both the park and business centers adjacent to the park. More traffic will increase the noise level in the area and road maintenance in excess of present levels may be required.

3. Favorable Environmental Effects

The average annual floodwater damage will be reduced 92 percent ($89,360 to $7,210).

Land treatment will reduce average annual soil erosion from 2.6 tons per acre to 1.9 tons per acre.

Reduction of erosion in concert with sediment trapped behind the installed dams will reduce downstream turbidity by 46 percent.

Land treatment will retard runoff and increase wildlife habitat.

Municipal and industrial water storage will be provided to meet present and future needs. The availability of industrial water will encourage industrial growth.

The installation of a 3,500-acre park will provide both water and land based recreation facilities to the watershed and surrounding area.

The park will convert 3,500 acres to recreation use.

A total of 244 acres of warm-water fisheries will be included in the project.

Commercial development which will provide job opportunities will be stimulated especially on private land surrounding the park.

4. Adverse Environmental Effects

There will be approximately 310 acres of land used for dams, spillways and sediment and other permanent pools.

The stream fisheries below the dam will be temporarily impaired due to increased turbidity during the construction period.

Fish passage through four dams will be blocked.

There will be a total of 14,370 feet of stream covered or inundated by the dams, sediment pools, or other permanent impoundments.

There will be 1.61 miles (8,500 feet) of stream periodically affected by the flood pools.

Up to 168 acres behind the dams will be flooded when storm water is temporarily stored.

Extraction of minerals from the 435 acres underlying the dams and reservoirs will be restricted. This restriction will prevent the mining of 25,000,000 tons of coal.

Occasional periods of aquatic growth due to high natural fertility of impounded waters may occur.

There will be increased noise, traffic volume and road maintenance especially in areas surrounding the new park.

Some pollution due to dust and burning will occur during the construction period.

5. Alternatives

a. Land treatment only.

The alternative of land treatment alone would reduce the average annual floodwater damage by about $3,220 to an average annual damage of about $86,140. Water quality in streams would be improved through the reduction of turbidity and the watershed sediment yield would diminish from 200 to 140 tons per square mile.

The land treatment would include conservation practices such as conservation cropping systems (rotations), stripcropping systems, diversions, waterways, drains, drainage field ditches, ponds, spring developments, grassland plantings and managements. This alternative would cost $560,000.

b. Land treatment and acquisition of flood plain properties.

This alternative would include the benefits and impacts of the land treatment alternative. Acquisition of 100-year flood plain properties would include the purchase of approximately 102 homes and 43 commercial and industrial properties which are subject to flooding. This purchase would cost about 2.7 million dollars.

Aquisition of flood prone properties would eliminate residential and commercial properties and result in $43,000 average annual benefits. Flood damages would still occur to the highways and railroad. The watershed would not have additional water supply or recreation benefits. Relocating part or all of a community may cause unnecessary social and cultural pattern disturbances.

c. Land treatment, flood plain zoning, floodproofing and flood insurance.

For this alternative, the land treatment program would be installed, the 100-year flood plain would be zoned, as many homes and businesses floodproofed as practical and flood insurance would be made available to persons who wished to purchase coverage. The benefits and impacts of the land treatment program would be realized.

The area to be zoned would be the 100-year flood plain and the present development would remain. Future improvements would be restricted to projects that would not contribute to the flooding problem nor be susceptible to flood damage beyond minor repairs. Such improvements might be parking lots or recreation areas. The cost of zoning is estimated to be $50.000.

Floodproofing to the 100-year level would provide protection at a cost of about 1.05 million dollars. The cost of this alternative would be borne by the property owners. Flood walls could be constructed around the properties which range up to six feet high. These walls would cost about $3,500 per property. Floodproofing would not provide protection to utilities, roads, bridges or the railroad, nor allow the use of transportation facilities during inundation.

Flood plain residents could purchase federally subsidized flood insurance through the Federal Insurance Administration. Affected communities apply through the Pennsylvania Department of Community Affairs and are approved for insurance when they agree to zone flood plains from future development. Flood insurance provides a means of recovering a portion of a flood loss.

The cost of flood insurance will depend on the results of a detailed survey carried out by the Federal Insurance Administration.

d. Land treatment and recreation only.

The benefits and impacts of the land treatment program would be realized with this alternative. A recreation reservoir could be constructed which would cost about $1,000,000.

Recreation benefits and adverse environmental effects for this alternative are similar to those accruing from PA-661 of the proposed project. The level of flood prevention will depend on the storage included in the reservoir for that purpose.

This alternative provides no water supply and does not meet the level of flood protection requested by the sponsors.

e. Land treatment and water supply only.

An alternative of developing the land treatment program and a reservoir for water supply only was considered. The benefits and impacts of the land treatment program would be realized with this alternative. The cost of this reservoir was estimated to be $590,000. It would require that 50 acres of land be permanently committed to this use and mining would be restricted under 78 acres.

Water supply benefits for this alternative would be the same as those accruing for PA-661. Adverse environmental effects would be less because the dam and reservoir would require less land, The flood prevention benefits would be the same as Alternative d.

This alternative would not provide water-based recreation and it does not meet the level of flood protection requested by the sponsors.

An alternative method of obtaining water supply would be through drilled wells. Most of the rural area is now using well water. A combination of septic tank pollution and low aquifer yield (5-10 g.p.m.) creates problems in supplying 500 customers with water. The alternative of suing stream flow as a water supply source was considered. The summmer low flow of Cross Creek would not be sufficient to provide the future demand of 200,000 g.p.d.

F. No project.

The alternative of no project was considered. Acceptance of this alternative would eliminate all the adverse environmental effects of the proposed project. There would be no lands permanently or temporarily committed, streams would not be covered by dams or reservoirs, fish passage would not be restricted, and minerals underlying the sites would be available for use.

Without the proposed project the $86,300 average annual benefits would not be realized. (See Appendix C, Table 6.) Water oriented recreational demands would have to be met elsewhere or left unsatisfied, stream quality would continue at its present trend and municipal water would not be available for anticipated future needs.

This alternative would not provide the flood prevention, water supply or water oriented recreation requested by the sponsors.

6. Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity.

The population of the townships involved in this watershed has increased by about 110 persons (1.3 percent) between 1960 and 1970. During this time, land use has changed from crop production to less intensive forms of agriculture. Between 1964 and 1969, there has been a 25 percent decrease in farmland in Washington County. When this trend is projected to the watershed, there is an average reduction per year of 1,750 acres of farmland.

The comprehensive plan for the Cross Creek Watershed (February 1965) is concerned with present and future needs of the watershed for housing, highways, community facilities, utilities and land use. That report and the Cross Creek Watershed Work Plan are complimentary. Cross Creek, Hopewell, Independence, Jefferson and Mount Pleasant Townships, which are affected by the project, have planning commissions which concur with the proposed measures.

Cross Creek is located in the Ohio River Basin. It was studied under both the comprehensive survey of that basin and the Appalachian Studies for the development of water resources. Although the area was not mentioned in either report, the project will fulfill part of the purposes and goals of the recommendations of those studies.

The project is not expected to correct any environmental problems on a short-term basis. Pollution due to sediment, dust, and burning is likely to occur during construction but will cease upon completion of the project.

The project will reduce options for long-term land use only on areas incorporated into the dams, spillways, sediment pools and flood pools. It is compatible with the long-term land use trends of the adjacent land resources and will help to build more stability into the economic system. Ground water resources and air resources are not expected to be impaired.

The completed project is expected to be effective in conserving land and water resources long after its designed life. The degree of flood prevention will remain high if land use changes do not substantially alter hydrologic conditions. Sediment control will continue long after the designed life of the structure, especially if hydrologic conditions are improved beyond those proposed in this project or if sediment is removed from the storage areas provided at each site.

Cross Creek Watershed lies in the Pittsburgh-Wheeling-Beaver Subregion (05 03) of the Ohio Region (05) designated by the Water Resources Council. The 1967 Pennsylvania Soil and Water Conservation Needs Inventory (p. 245) lists five feasible P.L. 566 projects in that subregion, two of which are under construction (Wheeling Creek and Harmon Creek). The completion of a 125-acre lake in Harmon Creek Watershed will provide some recreation for the area but will not satisfy present and future recreation demands.

The Cross Creek Watershed Project Work Plan was reviewed by appropriate state and federal agencies and is compatible with other water resource projects. The cumulative effects of the project outside of the watershed area are as follows:

a. The development of the 228-acre lake and adjoining park facility and the warm-water fishery provided in sediment pool of single-purpose dams will provide recreation to the region.

b. The reduction of flooding and potentials for related catastrophes will have a settling effect on areas outside the watershed.

c. Passage of goods through the watershed will be maintained because of protection afforded rail and highway facilities.

d. Sediment contributed by Cross Creek to the Ohio River will be reduced by approximately 5,000 tons per year.

Cumulative environmental effects within the watershed will include the improvement of water quality and the quality of wildlife habitat. These amenities are due to the effect of land treatment and to the reduction of stream turbidity.

7. Irreversible and Irretrievable Commitments of Resources.

There are about 310 acres of cropland, pasture and forest land used for dams, spillways, sediment, water supply and recreation pools. Acres of each land use committed are shown below:

Site No.	Committed Acres of Cropland	Pasture	Forest Land	Total
PA-659F	2	12	-	14
PA-660	4	7	3	14
PA-661	9	220	38	267
PA-662	2	5	8	15
Total	17	244	49	310

There will also be a total of 14,370 feet of stream covered or inundated by the dam, sediment pool or other permanent impoundments.

During flood producing storms in the watershed, there may be as much as 168 acres of land inundated in the flood pools of these dams. This periodic flooding will prohibit some intensive land uses. Land areas occupied by dams, sediment pools and emergency spillways are permanently committed.

All land developed under P. L. 566 with federal cost-sharing cannot be sold or disposed of during the evaluated life of the project except to a public agency which will continue to maintain and operate the development for its intended use.

Mineral rights have been purchased under each site to provide support for the dams and reservoirs. Extraction of 25,000,000 tons of coal from under these areas will be restricted. In all, about 435 acres under these sites will be committed.

8. Consultation with Appropriate Federal Agencies and Review by State and Local Agencies Developing and Enforcing Environmental Standards.

a. General

The application for assistance to the Cross Creek Watershed by the Washington County Soil and Water Conservation District (now called the Washington County Conservation District), Washington County Commissioners, and the Supervisors of Cross Creek, Hopewell, Independence, Jefferson and Mount Pleasant Townships was approved by the Pennsylvania Soil and Water Conservation Commission (now called the State Conservation Commission) for the Governor of the Commonwealth in 1964. The application was initially endorsed by the Washington County Planning Commission, Cross Creek Regional Planning Commission, and the Avella Chamber of Commerce.

Notification of the initiation of a preliminary investigation and request for information and suggestions were made to the following agencies:

Farmers Home Administration, Agricultural Stabilization and Conservation Service, U. S. Army Corps of Engineers, U. S. Fish and Wildlife Service, Urban Renewal Administration, Pennsylvania Departments of Transportation, Agriculture, Forests & Waters (now Department of Environmental Resources), Health (now part of Department of Environmental Resources) and the Pennsylvania Fish and Game Commissions. The results of the preliminary investigation were reviewed with the sponsoring organizations and interested individuals and agencies on October 29, 1964. The project was authorized for planning February 15, 1965 and notification and request for interaction with the project was made to the above listed agencies, as well as the U. S. Bureau of Outdoor Recreation, Bureau of Community Development of the Pennsylvania Department of Commerce, and the U. S. Department of Health, Education and Welfare.

During the planning of the watershed, close cooperation was maintained with all these groups. Alternatives suggested by organizations and individuals were considered in developing the plan and adopted when feasible. The Pennsylvania Department of Transportation assisted in determining road relocations, costs and priorities. Railroads located in the watershed aided in evaluating costs related to damage and relocations and local utilities aided in determining costs and priorities of gas, electric, oil and water line relocations.

Studies were made by consultants for the Washington County Regional Planning Commission, Washington County Department of Parks and Recreation, and the Cross Creek Regional Planning Commission to develop comprehensive plans for land use, recreation, sewage treatment, and water supply for the watershed. Cross Creek Watershed was planned using these studies and guidelines in the formulation of the project. Data was also supplied by the U. S. Bureau of Sports Fisheries and Wildlife of the U. S. Fish and Wildlife Service, Pennsylvania Fish Commission and the Pennsylvania Department of Environmental Resources in formulating portions of the plan relating to water quality, wildlife and recreational development. Consultants were obtained by the Soil Conservation Service to determine the relationship of coal underlying the proposed sites to their development and liaison with local coal interests was developed in that study.

All during the planning process, meetings were held with federal and state agencies, sponsors and local groups. Alternatives suggested by these organizations were considered in developing the plan and adopted when feasible.

Prior to the presentation of the final plan, a public information meeting was held at the firehouse in Avella on March 15, 1971, to provide all citizens the opportunity to express their views on the project. This meeting was attended by approximately 100 persons. The project was explained and a question and answer session followed. There were some questions from property owners who would be affected by the project but no opposition was expressed.

An informal field review of the tentative work plan was held April 19, 1971, in Washington, Pennsylvania. All concerned local, state and federal agencies were invited to this meeting and were asked to prepare comments about the work plan. The following agencies were also invited to the meeting:

U. S. Geological Survey
Federal Water Quality Administration (now the Environmental Protection Agency)
Bureau of Public Roads
Southwestern Pennsylvania Regional Planning Commission
Washington County Agricultural Extension Association
Pennsylvania Department of Community Affairs
Appalachian Regional Commission
Pennsylvania State Planning Board

The work plan and the Draft Environmental Statement have been prepared considering all the comments and recommendations provided by the sponsors and other interested state and federal agencies.

b. Discussion and Disposition of Each Problem, Objection, or Issue Raised on the Draft Environmental Statement by Federal, State and Local Agencies, Private Organizations and Individuals.

Comments on the Draft Environmental Statement were requested from the following agencies and they responded as follows:

Regional Clearinghouse (Southwestern Pennsylvania Regional Planning Commission)	Responded
Governor's designated agency for reviews and approval of PL-566 projects (State Conservation Commission of the Pennsylvania Department of Environmental Resources)	Responded
State Clearinghouse (Pennsylvania Office of State Planning and Development)	Responded
U. S. Department of the Interior	Responded
U. S. Environmental Protection Agency	Responded
U. S. Department of Health, Education, & Welfare	Responded
U. S. Department of Commerce	Responded
U. S. Department of the Army	Responded
U. S. Department of Transportation	Responded
U. S. Appalachian Regional Commission	No Response
Regional Clearinghouse (Economic Development Council of Southwestern Pennsylvania)	No Response

Discussion of comments received during the review of the Draft Environmental Statement on the Cross Creek Watershed Project are summarized by responding groups below.

STATE AGENCIES

REGIONAL CLEARINGHOUSE: Southwestern Pennsylvania Regional Planning Commission

Comment 1

In our review of the Draft Environmental Statement, we have noted that the greater part of the Statement is a recapitulation of material contained in the work program because the nature and purpose of the proposed project is to improve the natural environment. Comparatively little space is given to adverse environmental effects. While we agree that the adverse effects such as loss of land or inundation of land due to impoundment of water are minor compared to the benefits to be achieved by the project, we would again call to your attention two points raised in our review of the work program:

> Availability of public water to Avella from the proposed multi-purpose reservoir accentuates the need for the early planning and construction of sewage facilities in order to avoid the environmental problems that would be created by the provision of water service to the community and the continual use of on lot sewage disposal facilities.

Response 1

Water quality problems related to sewage disposal have been recognized by the Washington County Planning Commission and they have developed a sewage treatment plan for Avella (the largest community in the watershed) and adjacent areas. These proposed sewage treatment facilities are also recommended in the sewage plan of the Regional Planning Commission. The final environmental statement indicates in the "Structural Measures" portion of the "Planned Project" part of the "Description" section that plans also exist for the construction of a central sewage system which will provide for the Cross Creek County Park and associated developments. The Soil Conservation Service will continue to encourage the residents of the watershed to provide facilities necessary to eliminate any environmental problems associated with inadequate sewage treatment.

Comment 2

Eight archeological sites will be inundated by construction of the multi-purpose dam to be constructed on Cross Creek. See page two, paragraph three of our letter of April 16, 1971. (Page eight of the Draft Environmental Statement states that: "There are no other known areas of archeological or historical value...".)

STATE AGENCIES

Southwestern Pennsylvania Regional Planning Commission(cont.)

Response 2

There are six sites in the permanent lake of PA-661 and two sites in the emergency spillway area of PA-660 that are thought to be indian camps or villages. The Regional Archeologists of the National Park Service, U.S. Department of Interior is being notified that these proposed dams will affect these sites. It is hoped that a cooperative program can be developed between the park service and the Carnegie Museum to assess the archeological significance of these sites. If they are important, they should be studied prior to inundation.

There is an opportunity to develop these areas and other areas of indian culture in conjunction with other historical and cultural programs of the Cross Creek County Park (PA-661). The presence of these archeological sites within the project area are noted in the "Archeological and Historical Values and Unique Scenic Areas"portion of the "Environmental Setting" part of the "Description" section of the Final Environmental Statement.

Comment 3

In addition, we recommended in our review of the work plan that "some thought should be given to the inclusion of swimming facilities in Cross Creek Park." The Draft Environmental Statement, in enumerating the recreational benefits of the proposed project, does not give any indication that consideration has been given to this recommendation or to the other two points enumerated above.

Response 3

Swimming facilities are needed to meet outdoor recreation demands in southwestern Pennsylvania but the level of nutrients in Cross Creek at the impoundment site (PA-661) may make this type of development unwise. The reservoir is to be used for public-water supply and this also restricts the desirability of using the reservoir for bathing.

Comment 4

As a result of our review, we find that we can endorse the Draft Environmental Statement for the Cross Creek Watershed with the provision that in its final form the Statement deal with the points enumerated above.

Response 4

Responses to the points mentioned in Comment 4 are included in Responses 1,2, and 3 above.

STATE AGENCIES

GOVERNOR'S DESIGNATED AGENCY FOR REVIEW AND APPROVAL OF PL 566 PROJECTS:
State Conservation Commission of the Pennsylvania Department of Environmental Resources

Comment

The Environmental Impact Statement that has been prepared is most complete. The commission hopes for a speedy Congressional approval of the Project in order that installation can begin.

Response

No response necessary

STATE AGENCIES

STATE CLEARINGHOUSE: Pennsylvania Office of State Planning and Development.
Pennsylvania Department of Environmental Resources through the State Clearinghouse
Comment 1

The project is approved for funding and implementation. The Department of Environmental Resources retains an interest in this project and environmental effects encountered or anticipated in the further development of this project.

Response 1

No response necessary

Comment 2

Benefits to flood control are attributed to the reduction of damage to the railroad. I question if long-term benefits from this source can be claimed for this project. There are no industries in the area and no railways passenger service to offer. There is a serious question whether this railroad line will remain in operation for a significant amount of time.

Response 2

The railroad now serves Cross Creek Watershed and encouragement of industrial development is presently taking place. The availability of municipal and industrial water supply in PA-661 should also enhance industrial-development potential. Such development could require railroad transportation for the delivery of goods, supplies and raw materials.

Comment 3

There is a statement that storage be provided for low flow augmentation as required by the Department of Environmental Resources (DER). This is to clarify the language and to indicate that DER requires minimum riparian releases from water-taking points and dams which might use or completely shut off the flows in the stream. This action does not necessarily entail low flow augmentation, which is an increase of natural streamflow provided by draft or storage. The specific release requirements for this particular structure would have to be reviewed in detail upon receipt of applications.

Response 3

Appropriate changes have been made in the "Structural Measures" portion of the "Planned Project" part of the "Description"Section of the Final Environmental Statement.

Comment 4

The environmental impact statement claims that there will be improvements to benthos and fish life below the dam. Our experience in examining streams below impoundments indicates a reduction in the diversity of benthos. Dominant populations consist of caddis flies with black flies frequently present in abundance. There is usually an absence of may flies and stone flies which are found in unobstructed streams. In some cases, this condition may increase the over-all standing crop, but the diversity and food availability in the food chain is diminished. The apparent improvement of fisheries is thought to be due partially to the obstruction and accumulation of fish below the obstruction as they are stopped in their normal upstream migrations.

Response 4

The environmental statement no longer claims an improvement to benthos below the dam. Studies of benthic and fish diversity by Cooper (1972) indicates that there is some diversity restriction in much of the Cross Creek drainage system because of excessive turbidity. Measures to improve water quality are a large part of the Cross Creek project and an improvement in the fish life is therefore expected.

Comment 5

The statement claims improvement of water quality due to reduced sediment discharges. Sediment discharges are reduced by erosion control practices on the land and by controlling peak flows in streams to reduce bank erosion. It is not clear whether the thrusts of the erosion control program will be only above the dam, or more or less uniform on a watershed-wide basis. To protect the stream below the dam, accelerated erosion control is needed there also.

Response 5

Erosion control will be applied in a watershed-wide program.

Comment 6

The statements relating to the Independence Township Municipal Authority are well taken. This authority has suffered frequent and prolonged water shortages. Installation of a reliable source should help to alleviate this problem.

Response 6

No response necessary.

Comment 7

The Cross Creek Watershed is extremely underlain by a major coal deposit, the Pittsburgh coal seam. This represents an important economic resource for the area, and even more important in this time of energy shortages. The Draft Environmental Statement recognizes the existence of the Pittsburgh coal on page 2 but fails to consider the impact of the project on the coal and the impact of the coal on the project.

Response 7

The reference to the presence of the Pittsburgh coal on page 2 of the Draft Environmental Statement was in a part of the environmental statement which describes the watershed. A thorough description of the effect of the Pittsburgh coal on the project and the loss of these resources due to project installation is on page 17 of the Work Plan and in the "Environmental Impact", "Adverse Environmental Effects" and Irreversible and Irretrievable Commitment of Resources" Sections of the Final Environmental Statement.

Comment 8

As stated on page 51 of the work plan for Cross Creek Watershed which is issued by the U.S. Soil Conservation Service, each of the proposed dam sites and lake impoundments is underlain by the Pittsburgh coal. In as much as the depth of the coal at each location is not very great, to build the dams and impoundments would likely mean that the coal not be mined out from under each of the dam and lake sites. If they were to try to mine the coal, it could cause sufficient subsidence, even with pillars, to result in leakage or flooding into the coal mines. Furthermore, the subsidence would also be a hazard to the structural soundness of the dams and the net result, therefore, would be that the coal probably could not be mined under the dam and lake areas resulting in a loss of this valuable coal reserve.

Response 8

The work plan for Cross Creek Watershed comprehensively explains (page 17) the steps which will be taken before construction to preserve the integrity of the foundations of the proposed dams. See also Response 7 above.

Pennsylvania Office of State Planning and Development (continued)

Comment 9

We have no indication of oil and gas production in the immediate facilities. However, a careful search should be made of the records to see if any deep oil or gas wells were ever drilled under the proposed impoundment sites since such well holes in the past were often left unplugged, resulting in salt-water seepage from below.

Response 9

The Cross Creek Gas Shortage Field is located just west of PA-659F and there have been numerous gas and oil wells drilled within the watershed. A search of the records of the Bureau of Topographic and Geologic Survey, Pennsylvania Department of Environmental Resources and contact with local oil and gas utilities revealed no known oil or gas wells within the flood pools of the proposed dams. A thorough ground search will be conducted during the final geologic investigation of these sites and if any unrecorded wells are found, they will be sealed.

Comment 10

The "Work Plan" for the subject study was reviewed by various Divisions of D.E.R. on April 16, 1971. This Draft EIS appears to be for the same plan which we endorsed in 1971.

Response 10

The environmental statement is for the work plan reviewed and endorsed by Pennsylvania Department of Environmental Resources in 1971.

Comment 11

In 1971, we were concerned about the cost of mineral rights from our expereince with the proposed Buffalo Creek Site. Page 30, Paragraph 3, indicated that mineral rights have been purchased.

Response 11

Mineral rights are being purchased for the proposed dam sites. Their estimated value has been provided by the sponsoring local organization.

Comment 12

A watershed map would have been helpful during the review of the subject statement. We should suggest, as a general policy, that a map should be included as a part of the statement.

Pennsylvania Office of State Planning and Development (continued)

Response 12

The project map formed Appendix D of the Draft Environmental Statement and Figure 5 of the work plan. Possibly, the maps were either lost or detached from the environmental statement before or during their review.

STATE AGENCIES

STATE CLEARINGHOUSE: Pennsylvania Office of State Planning and Development

Pennsylvania Fish Commission through the State Clearinghouse

Comment 1

The damage figures are based on the 1912 flood which was a good bit greater than the 100 year flood against which the project is designed to protect. The 1912 flood had a flow of 16,000 cfs while the 100 year flood would be only 13,000 cfs. The damage figures for this flow could be very much lower than for the 1912 flood. Even though they use a damage reduction figure in estimating B/C ratio, these figures are misleading.

Response 1

Damage figures for the watershed project are not based on the 1912 flood but on damage which would presently occur during floods of any magnitude including the key flood. The extent of damage from the 1912 flood was used in conjunction with field analyses and interviews to make realistic estimations of damage which would occur at variuos levels of inundation. Damage figures therefore represent the present development and not 1912. A description of the methodology employed in the analyses is located on pages 52 and 53 of the Cross Creek Watershed Work Plan.

Comment 2

There are no flows given for any of the dam locations. For a project that was authorized for planning in February of 1965;there has been plenty of time to install a few weirs and accumulate some flow records.

Response 2

Stream gagers should have more than five to ten years of record if the data is to be useful in analyzing flood flows. The Soil Conservation Service, United States Department of Agriculture, has developed the "soil-cover-complex" method for predicting peak flows without using stream gages. The synthetic flows are checked where and when it is possible to determine their adequacy.

Regional analysis is one of the methods used by the Soil Conservation Service to check the parameters used in the "soil-cover-complex" method. This method is accepted by other federal agencies and is used by many engineering consultants.

A thorough discussion of this procedure is covered in the Handbook of Applied Hydrology (1964); Section 21; pages 21-1 through 21-95.

STATE AGENCIES

Pennsylvania Fish Commission (continued)

Comment 3

The recreation lake (PA-661) should provide aquatic recreation facilities in an area where they are needed. Since these are warm-water streams, the stream blocking will not have a serious detrimental effect. The three smaller pools (5, 8, and 8 acres) cannot be expected to provide any sustained yield of game fish; however, PA-661, with a 228 acre recreation pool, could be managed to provide satisfactory fishing. As stated in the report, aquatic weed control could be a problem in this lake, so there should be provisions to allow lowering the lake at least five feet over winter as needed for weed control.

Response 3

The gated release mechanism to be installed for water level control in the multiple-purpose reservoir (PA-661) can change the reservoir stage for management purposes. Cooper (1972) in a biological survey of the watershed indicated that the three small pools "have limited potential for development of warm-water fisheries, but these should not be ignored." Small lakes of 5 to 10 acres are easier to manage from a fishery standpoint and a worthwhile fishery could be maintained in these ponds.

Comment 4

Overall, the Pennsylvania Fish Commission concurs with the project and would be willing to manage the fishery in PA-661 if requested to do so.

Response 4

The Cross Creek Watershed work plan on page 21 makes the following statement:

"The Pennsylvania Fish Commission has the responsibility for fishery management of public waters within the Commonwealth. It is anticipated that the Fish Commission will stock the reservoir at PA-661 at an initial cost estimated to be $45,000. This cost is for warm water species which will be stocked over a two-year period. Management of the fishery will require an estimated $5,700 annually. If the water quality in the reservoir proves to be satisfactory for two-story management, trout will be stocked at an additional cost. Enforcement of the Water Safety and Boating Regulations, will be the responsibility of the Pennsylvania Fish Commission also. It is estimated that this cost will be $3,400 annually.

STATE AGENCIES

STATE CLEARINGHOUSE: Pennsylvania Office of State Planning and Development

Pennsylvania Department of Transportation through the State Clearinghouse

Comment 1

The proposed improvements will necessitate the inundation of portions of the following legislative routes:

L. R. 62185
L. R. 62024
L. R. 62035
L. R. 62133
L.R. 62022

The work plan proposes that a section of L.R. 62185 be raised to prevent inundation while portions of L.R. 62024,L.R. 62035 and LR. 62133 are to be relocated. These proposed changes should not pose any serious transportation problems.

Response 1

No response necessary

Comment 2

Plans for the main reservoir (PA-661) however indicate that present L.R. 62022 and L.R. 62133 are to be abandoned. A proposed county park road will connect L.R. 62133 north of the dam to L.R. 62022 east of the park but portions of L.R. 62133 and L.R. 62022 will be severed. This results in a loss of a north-south traffic artery between Traffic Route 844 at West Middletown and Traffic Route 50 to the north. Consideration should be given to the possible relocation of this facility.

It is our understanding that any costs associated with the necessary changes in the state highway system will be borne by the Sponsoring Local Organization and the Soil Conservation Service, and not by the Department of Transporation.

We suggest that the Soil Conservation Service coordinate the proposed highway system changes with the Department as soon as possible,

Response 2

The relocation of legislative routes between West Middletown and Route 50 will be coordinated with the Pennsylvania Department of Transportation during the final design phase of the project. The relocation will be handled in such a manner as to prevent disruption of the areal-traffic flow. The sponsoring organization will be responsible for costs associated with road relocations for the project.

STATE AGENCIES

Pennsylvania Department of Commerce through Pennsylvania State Clearinghouse

Comment

The Department of Commerce of the Commonwealth of Pennsylvania had no particular comments but are in general favor of the project.

Response

No response necessary.

FEDERAL AGENCIES

U.S. Department of the Interior

Comment 1

The proposed action would not affect any existing or proposed units of the National Park System, nor any site eligible for registration as a National Historic, Natural or Environmental Education Landmark.

Response 1

No response necessary

Comment 2

Although both the work plan and the environmental statement mention mineral occurrences in the project area, we believe the discussions are inadequate. The general and detailed maps do not show any mineral activity. The presence of the Pittsburgh coalbed and other deeper beds is mentioned but no mention is made of oil and gas fields adjacent to the four reservoir sites. The environmental statement shows that coordination was established with local utilities to determine "costs and priorities of gas, electric, oil and waterline relocations," yet, these facilities are not shown on the maps.

There are many abandoned wells throughout the Cross Creek Watershed. The flood pool area at each of the proposed sites should be thoroughly surveyed to locate and properly plug any abandoned holes. Otherwise unwanted water seepage and producing oil and gas horizons might result and pollution of the reservoirs might occur. Any future drilling of oil or gas wells within the watershed would not be affected by the project. The limestone and clay resources of the county are outside the project area.

At Site No. PA-660, oil and gas pipelines pass through the project area. Because of the proximity of the producing oil and gas fields in this watershed, there may be smaller gathering lines that also will be affected by construction. A map should be included in the environmental statement showing all the oil and gas pipelines and the statement should mention if and how these lines will be affected by the project.

Response 2

No oil or gas wells were found within the sites following ground and record searchs. As noted in the "Structural Measures" portion

of the "Planned Project" part of the "Description Section" of the Final Environmental Statement pipelines of all types occurring in the site pools will be cleared. See also, Comment and Response 9 to the State Clearinghouse, Department of Environmental Resources.

Comment 3

Under "Irreversible and Irretrievable Commitments of Resources" the environmental statement should indicate the resource loss involved with the commitment of the Pittsburgh coalbed under each damsite and flood pool.

Response 3

The "Irreversible and Irretrievable Commitments of Resources," section, page 30, of the Draft Environmental Statement, indicates that mineral rights have been purchased under 435 acres of the project area and coal extraction (25,000,000 tons) from the areas would be restricted. The sponsoring organizations estimated a cost for those mineral rights of $108,000.

Comment 4

The statement has not presented sufficient detail on the long-term effects of the project as they relate to wildlife resources. It is generally recognized that habitat deficiencies are a major limiting factor controlling wildlife populations. Although corrective measures for habitat inadequacies have been suggested to maintain satisfactory wildlife populations, the statement fails to point out how improvements will be realized. We feel that the proposed wildlife food and cover measures are not a wholly satisfactory substitute for the habitat lost to structural developments and land use conversion. The benefits of these techniques remain to be analyzed. In the face of growing populations and intensive land changes the statement should put more emphasis on management of the surviving converts, as these valuable areas are located in proximity to large human populations and are representative of fragile ecosystems already in short supply.

Response 4

The wildlife habitat loss as a direct result of the installation of the structures proposed in this project is 310 acres - 17 acres of cropland, 244 acres of pasture land, and 49 acres of forest land. Of this total, 21 acres will be used for sediment pool areas, 31 acres for the embankments and spillways, and 258 acres for permanent pools.

After construction, the Sponsors and the Soil Conservation Service will reestablish an adequate stand of mixed permanent vegetation on the embankment and spillway areas (31 acres). This cover will be equal to or superior to the original cover in terms of value for wildlife food and cover.

Development of sites in this project will create 244 acres of aquatic habitat for warm water fish and will provide at least 8 miles of shoreline edge habitat for wildlife. In terms of wildlife food and cover, this edge will be more productive than the 261 acres of cropland and pastureland used to develop these sites. The food and cover value of the existing pastureland is low.

The land use conversions projected in the Statement will occur because of economic conditions and not as a result of the project. The land treatment portion of this project, which is voluntary and currently underway, will establish, improve and protect wildlife food and cover on 4,500 acres of cropland, 6,000 acres of grassland and 1,500 acres of forest land. See page 12 of the Statement for a listing of measures already applied. Measures having high value for wildlife food and cover include conservation cropping systems, strip cropping, wildlife upland habitat management and woodland improvement cuttings.

Also see the response to comments 12,17,18,19 and 20 of the U.S. Department of the Interior.

Comment 5

The multi-purpose impoundment is an important feature in enhancing the fishery resource and will serve to improve water quality and supply, as well as reduce the threat of flooding.

Response 5

No response necessary

Comment 6

It is commendable that the draft environmental statement reflects consultation with the National Register of Historic Places and the Pennsylvania State Historic Preservation Officer. We note that it was determined that no sites listed or presently known to be eligible for listing in the National Register of Historic Places will be affected. However, we believe the environmental statement shows insufficient attention to cultural (historic, archeological, architectural) resources.

Despite the consultations, it is evident that cultural resources have not been determined to be present or absent through a direct,interdisciplinary investigation of the project area. Accordingly, cultural values are not being fully considered during planning. The stated intention to notify the National Park Service and the Pennsylvania State Historic Preservation Officer before development begins may result in some mitigation for cultural values previously undetected, but the environmental statement is indefinite on that point. It does not affirm that any positive action will follow notification of those agencies.

Cultural resources in the affected environment should be investigated by persons professionally trained to locate, identify, and evaluate them. The results of that investigation should be relfected in all portions of the environmental statement, so that cultural values are substantively described as environmental resources, projects effects assessed, appropriate mitigating measures developed, and unavoidable adverse effects and any irreversible and irretrievable commitments of cultural resources accounted for.

Response 6

Investigation of the culture of the area, requested in the above Comment, was performed by professional specialists of Goerge R. Kemp and Associates of Pittsburgh, Pennsylvania. The Final Environmental Statement has been expanded to include information regarding the culture of the area. Steps to preserve and mitigate adverse effects on culture by this resource program had been included in the facilities proposed for the Cross Creek County Park. Additional details reqarding these facilities can be obtained from the master development plan for the park. See also the response to Comment 2 by the Southwestern Pennsylvania Regional Commission.

Comment 7

Subsidence due to subsurface mining of coal appears to have been adequately considered and necessary protective measures have been taken. Significant adverse environmental impact related to the geology of the area of the proposed project is not anticipated.

Response 7

No response necessary

Comment 8

From a hydrology standpoint, the statement is reasonably adequate and accurate in its evaluation of the environmental impact of the pro-

posed action, and we believe there should be no adverse effect on the water resources of the region.

Response 8

No response necessary

Comment 9

Summary Sheet - Summary of Environmental Impact and Adverse Environmental Effects - Page 2, Sentence 2 of the Draft Environmental Statement.

We recommend that "Improve wildlife habitat...." be changed to read, "Maintain wildlife habitat. . . ."

Response 9

In view of the extensive land treatment program installed in the project and the conservation measures planned for the proposed park, the statement of "Improve wildlife habitat. . . ." is well justified. Details of the land treatment program have been added to the "Land Treatment" portion of "Planned Project" part of the "Description" section of the Final Environmental Statement.

Comment 10

Environmental Setting-Fish and Wildlife - Page 4, Paragraph 1 of the Draft Environmental Statement.

This introductory paragraph should contain the primary game fish found in Cross Creek and its tributaries.

Response 10

Primary game fish of Cross Creek and its tributaries are listed in leader work on page 5 which follows paragraph 2 of page 4. Additional identification of these game fish is now included in paragraph 1.

Comment 11

Page 7, Paragraph 1 of the Draft Environmental Statement.

Omit the last sentence and add: "No rare and endangered fish or wildlife species are present in the Cross Creek Watershed."

Response 11

The above comment has been adopted.

Comment 12

Water and Related Land Resource Problems- Fish and Wildlife - Page 14, Paragraph 2 of the Draft Environmental Statement.

Land treatment practices listed do not include wildlife habitat improvements. It should also be noted that the Pennsylvania Game Commission will provide technical assistance to this aspect of the program. We emphasize that habitat quality must be improved in order to maintain existing supply levels in light of the reduction in wildlife habitat resulting from this project. As in agriculture, the remaining wildlife habitats should be managed so as to produce a larger crop on a smaller area.

Response 12

The Water and Related Land Resource Problems section of the environmental statement describes watershed problems and does not discuss the proposed land treatment project. The land treatment project is described under the "Land Treatment" portion of the "Planned Project"part of the "Description" section.

Paragraph 4, page 2, of the reconnaisance report of the U.S. Fish and Wildlife Service dated May 19, 1965, states that "The Pennsylvania Game Commission is not interested in this project because of the limited opportunities it provides for wildlife improvement."

Comment 13

Structural Measures - Page 16, Paragraph 6 of the Draft Environmental Statement.

Although mineral rights will be acquired as safety features for the dam, the statement does not recognize the vulnerability of the fishery habitat to future mineral developments. It is recognized that the influence of acid mine water presently is negligible, due to the alkaline headwater stream. (Page 8). However, it is felt that purchase of mineral rights or restriction of mineral exploitation on the headwaters should be considered to prevent acid mine pollution problems in the future. Mining operations should also be prevented from interfering with recreation activities created by the project.

Response 13

The waters of Pennsylvania are protected by the requirements of "The Clean Streams Law" from contamination through mining or other activities. A recent hearing (March 1, 1972) was held by the Department of Environmental Resources, Commonwealth of Pennsylvania, with regard to a request to mine coal in the headwaters of PA-661. The results of the hearing denied a permit to strip coal from the area. The committee made this statement.

"The Committee, after a thorough review of the testimony presented, is satisfied that the proposed mining operation carried out in the manner described in the application may meet the requirements of "The Clean Streams Law." However, the Committee also realizes there are other things involved that must be taken into consideration. Whenever any use of a mineral resource is proposed and that use may adversely affect the public enjoyment of the natural,secnic, historic, and esthetic value of the environment, it is within the Commonwealth's authority to conserve and maintain these public natural resources by denying development of the mineral resource. The members of the Committee unanimously agree that the public interest is better served in protecting the public natural resources of the subject area and that this outweighs any potential benefit from operation of the proposed mine."

Comment 14

Page 17, Paragraph 3 of the Draft Environmental Statement.

Eventual installation of a sewage system is planned for the recreational facility, but the statement acknowledges that no public sewage treatment facilities exist (page 15). As this sewage is a possible pollutant to the recreational lake and downstream reaches, more detailed procedures of planning is necessary for assessment.

Response 14

Sewage facilities as recommended by the Regional Planning Commission's Regional Sewerage Plan provides for public treatment. Sewage treatment facilities are planned for developments associated with the proposed recreational installation. The Sponsors will continue to encourage residents of the watershed to provide adequate treatment facilities so that environmental problems may be eliminated. The Pennsylvania Department of Environmental Resources is responsible for monitoring water quality and enforcing compliance with its standards. County Health Officials are responsible for the maintenace of adequate sewarage facilities for the watershed.

Comment 15

Page 18, Paragraph 2 of the Draft Environmental Statement.

Comments, as above, are applicable to processing of employee waste during the construction phase.

Response 15

As noted in the "Structural Measures" portion of the "Planned Project" part of the "Description" Section of the Final Environmental Statement,employee wastes, generated during the construction phase of the project will be collected and removed from the site and disposed in a sewage treatment facility.

Comment 16

Page 18, Paragraph 4 of the Draft Environmental Statement.

Flood plain zoning should be recommended to prevent further flood plain development expected to result from the project (page 22).

Response 16

The Soil Conservation Service strongly encourages sponsors to manage their flood plains to preclude development in areas where flooding would take place. The Soil Conservation Service will provide assistance in developing flood plain management maps and criteria. To prevent unwise development of the flood plain the sponsoring local organization will publicize at least once annually the nature and extent of the hazards remaining in areas subject to the 100-year flood. These organizations will prevent, to every extent possible, development (both reconstruction and new) in the 100-year flood plain.

Comment 17

Environmental Impact - Fish, Wildlife and Recreation - Page 22, Paragraphs 3 and 4 of the Draft Environmental Statement.

The pattern of land use in the project is toward increasing pasturelands and toward pole stage and saw-log stage forests. This trend indicates a general decline in small game habitat. In the face of growing populations and intensive land use, more emphasis must be placed on managing the remaining habitat.

Response 17

The need for more emphasis on managing land for wildlife habitat in now cited in the Final Environment Statement. Land treatment for wildlife habitat management has always been included among the proposed practices to be installed by the project.

Comment 18

Favorable Environmental Effects - Page 24, Paragraph 3 of the Draft Environmental Statement.

The increase in wildlife habitat through land treatment is not necessarily certain. The conversion of 32 percent of the cropland deprives many species of their primary food sources. Therefore, it is suggested that "maintain" rather than "increase" be used to more appropriately describe the effects of this water project.

Response 18

Cropland converted to other types of land uses without installation of land treatment for wildlife food and habitat would have an unfavorable ecological effect. In as much as one of the goals of the land treatment program is to increase the quantity and quality of wildlife habitat to the five percent level, the terminology, "increase wildlife habitat" is justified.

It should be further understood that the conversion of a cropland to other types of land use is not a project goal but is a continuing response to economic demands in the watershed. Most of the land use changes noted will occur independently of the project. The Final Environmental Statement has been expanded to identify the type and magnitude of the land treatment program.

Comment 19

Alternatives - Land Treatment and Recreation Only - Page 26 of the Draft Environmental Statement.

The statement, "Benefits to water quality, wildlife mitigation and flood prevention would be foregone" appears to be an over-simplification. These benefits would be lessened.

Response 19

The "Alternatives" section of the Final Environmental Statement has been modified to indicate that only "Benefits to public water supply and flood prevention would be foregone."

U.S. Department of the Interior (continued)

Comment 20

Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity - Page 29, Paragraph 2 of the Draft Environmental Statement.

In light of the foregoing comments, we suggest modification of the first sentence to read, ". . . improvement of water quality and the quality of wildlife habitat."

Response 20

The Final Environmental Statement contains this modification.

Soil Conservation Service - Bureau of Sport Fisheries and Wildlife Consultation

Soil Conservation Service personnel met with personnel of the area office, Bureau of Sport Fisheries and Wildlife on September 4, 1973, following the receipt of comments from the U.S. Department of the Interior to discuss the impact of the Cross Creek Project on wildlife resources. Concern by the Bureau over the possible loss of wildlife habitat from the apparent conversion of 2,300 acres of cropland to grassland and the trend from brushy forestland to a pole and saw-log stage was reviewed. It was determined that changes in land use would be a result of economic trends in the watershed which are independent of the project.

The Soil Conservation Service recognizes the need for increased management for wildlife habitat in the watershed. One of the goals of the proposed land treatment program is to increase the quantity and quality of wildlife habitat to a five percent of the total watershed area. The final environmental statement reflects this increased emphasis in managing land for wildlife habitat.

Other comments, relative to wildlife and other points raised by the U.S. Department of the Interior were discussed, and ideas which evolved are included in the final environmental statement.

FEDERAL AGENCIES

U.S. Environmental Protection Agency

Comment 1

Executive Order No. 11296, August 10, 1966, requires Federal agencies to "provide leadership in encouraging broad and unified effort to prevent uneconomic uses and development of the Nation's flood plains and, in particular, to lessen the risk of flood losses in connection with Federal lands and installations and federally financed or supported improvements." The responsibility imposed by this Executive Order and our mandated concern for the water quality consequences of flood damage require us to take an active interest in flood control. Experience has shown that unwise use of flood plain lands can incapacitate sewage treatment and water supply facilities and can result in the release of municipal and industrial waste materials to water courses leading to health hazards and the degradation of environmental quality.

To preclude any possibility of project induced flood damage, EPA requests the SCS to institute a requirement for local cooperation in the form of a commitment to institute appropriate planning and zoning measures for flood hazard areas and to participate in the Federal Flood Insurance Program. The commitment of county and municipal authorities to institute these measures should be secured prior to implementation of the structural flood control measures.

Response 1

The Soil Conservation Service strongly encourages sponsors to manage their flood plains to preclude development in areas where flooding would take place. The Service will provide assistance in developing flood plain management maps and criteria. To prevent unwise development of the flood plain the sponsoring local organization will publicize at least once annually the nature and extent of the hazards remaining in areas subject to the 100-year flood. These organizations will prevent, to every extent possible, development (both reconstruction and new) in the 100-year flood plain.

Comment 2

Present stream quality should be more fully and quantitatively documented. Nutrients, temperature, coliforms and parameters related to mine drainage as well as suspended solids are of special interest.

Response 2

The "Environmental Setting" part of the "Description" section of the Final Environmental Statement on the Cross Creek Project has been enlarged to provide more stream quality data.

Comment 3

Water quality in parts of the watershed may not presently meet the minimum water quality criteria listed in Table 1, Appendix C of this Environmental Statement. The North Fork of Cross Creek near Avella, Pennsylvania had a pH of 3.7, a hardness content of 1600 mg/l, a sulfate content of 1140 mg/l, and a total iron content of 7.5 mg/l when sampled in 1967 by the Federal Water Quality Administration. Cross Creek was sampled at the State line during this same survey and was found to have a pH of 6.5, a hardness content of 920 mg/l, a sulfate content of 1020 mg/l, and a total iron content of 3.0 mg/l. It is inferred from this data that the Pennsylvania Minimum Water Quality Standards Department of Environmental Resources for Cross Creek Watershed are not currently being met in all of the watershed. Specific violations appear to occur in pH, Iron and Dissolved Solids limits.

Response 3

Water quality samples were taken by E. L. Cooper (Station 1) from Cross Creek about two miles downstream from Avella (about 1½ miles upstream from the State line), during August of 1972. These samples had a pH of 8.2, alkalinity of 115 ppm, acidity of 5 ppm, sulfate content of 300 ppm and a conductivity of 1010 micromhos. The diurnal water temperature ranged (August 16-17) from 64 to 77°F while the air temperature ranged from 64 to 80°F. The dissolved oxygen content ranged from 8.0 to 9.8 ppm (always more than 94 percent of saturation). These water quality parameters are all within the limits expressed in Table 1, Appendix C of the Draft Environmental Statement.

Water quality was also sampled by Cooper at Station 6 on the North Fork (1500 feet upstream from St. John's Church) about 0.5 mile upstream from Avella on August 21 and 22, 1972. The samples had a pH of 7.6, alkalinity of 157 parts per million (p.p.m.) acidity of 5 p.p.m., sulfate content of 55 p.p.m. and a conductivity of 800 micromhos. The diurnal water temperature ranged from 67 to 70° F., while air temperature ranged from 60 to 74° F. The dissolved oxygen content was 8.5 p.p.m. (94% saturation). Once again these parameters were within the water quality standards set by the Pennsylvania Department of Environmental Resources for Cross Creek.

At Station 6 a small tributary bearing acid water enters Cross Creek and it has a pH of 3.1, acidity of 309 p.p.m., and 2,700 p.p.m. of sulfate.

Cooper notes in his report to the U. S. Soil Conservation Service that "water from the tributary is quickly neutralized by the highly buffered stream water (of Cross Creek) and appears to have almost no effect on the biota."

Station 1 and other sections downstream from Avella have abandoned coal workings in close proximity to Cross Creek.

As noted by the quality of the water samples taken from Cross Creek and its tributaries by Cooper and the Federal Water Quality Administration, it is possible to obtain samples of water which locally do not conform to standards of the Pennsylvania Department of Environmental Resources. The natural alkalinity of Cross Creek is generally very effective in restoring the quality of waters of Cross Creek to acceptable limits when locally polluted from acid drainage.

It should be noted that the locations cited are well downstream from all dam sites and that the water quality at the proposed reservoirs is well within the limits set by the Pennsylvania Department of Environmental Resources.

Comment 4

Eutrophication of the recreational water body PA-661 could destroy much of its value for recreation. Before constructing this structure a nutrient abatement program should be developed for its tributary area. Runoff of nutrients from agricultural use of fertilizers and disposal of animal wastes will have to be addressed. Commitments on the part of the local authorities and the individuals affected as needed to implement such a program should be secured prior to the commitment of Federal funds for construction. Since the other proposed structures also have permanent pools, nutrient runoff from their watersheds may also need to be abated.

Response 4

Water samples taken from Cross Creek at site PA-661 show a nitrate concentration ranging from .2 to .7 mg/l, nitrite from .006 to .014 mg/l, ammonia of .24 mg/l and no phosphorus. The pH, alkalinity and sulfate contents and conductivities measured from the site are among the lower values in the watershed. Even so, there is some potential for nutrient pollution, especially from nitrates in PA-661.

Most of the drainage of PA-661 will become Cross Creek County Park. Agricultural land use will therefore be restricted except for the planned demonstration farm where cultivation practices can also be controlled. Land use trends for the watershed indicate a decrease in cropland and increases in grass and forest. Fertilizer application will therefore diminish. No feed lots are present in the watershed and animal wastes are applied to agricultural land.

It is difficult to enforce the proper application of fertilizer on private land, especially during pressures of food shortage but proper fertilization is a part of a good management program. Extensive land treatment planned for this watershed features proper management as an integral part of the program. Regulations relative to sediment and erosion adopted on September 21, 1972, pursuant to Act 222, the Pennsylvania Clean Streams law require farms in the Commonwealth to have a sediment and erosion control plan by July 1, 1977. This plan, normatively a conservation plan, in conjunction with the forecast shift in land use and the sewage treatment facilities to be developed with Cross Creek County Park will provide a nutrient-abatement program for the planned reservoir.

The reservoir will be used for water supply for the area and water quality will be continuously monitored. If nutrient pollution results in a deterioration of water quality below acceptable levels, the county will take whatever steps necessary to solve this problem in compliance with existing water-quality regulations.

Comment 5

Since a major project purpose is to abate turbidity and since nutrients are often bound to suspended particles, the final EIS should consider the effect on nutrient levels of the proposed program.

Response 5

Phosphorus is frequently bound to suspended sediment particles. The extensive land treatment program to reduce erosion of nutrient carrying soil particles will reduce the potential for nutrient pollution of the waters of Cross Creek.

Comment 6

Turbidity decreases may also promote more complete utilization of dissolved nutrients by promoting increased photosynthesis. Conceivably, the stream channels could become choked with aquatic vegetation. This point should be discussed.

Response 6

Aquatic growth heavy enough to choke stream channels will not occur with a decrease in turbidity because the land treatment will reduce nutrient levels in the water of Cross Creek. See also Responses 4 and 5.

Comment 7

The nature and extent of mine related water quality problems should be documented. The need for measures to abate erosion or acid mine drainage should be identified. It may be that such measures are needed to compliment the program proposed so that its full potential can be realized.

Response 7

Water quality samples taken from Cross Creek and its tributaries indicate that surface waters have a pH ranging from 6.5 to 8.5. Water quality problems due to mine drainage is therefore not a large problem. The continued enforcement of the Pennsylvania Clean Streams Law will continue to identify and abate local pollution problems.

Comment 8

Contrary to assertions in the project report, on-site sewage disposal need not contribute to water quality degradation. However, it often does. Such degradation should be prevented to protect water supplies, aquatic biota and the recreational utility of the basin's water resources. This involves 1) adequate standards for construction and maintenance of septic tanks, sand filters, chlorination facilities, drain fields, etc., as may be required; 2) adequate enforcement of the standards and reasonably frequent inspection; and, 3) land use restrictions to prevent too great a density of such on-lot wastewater systems and to prevent siting drainfields in areas having inappropriate soil conditions (permeability, slope and water table height) or too close to water bodies or streams. Regarding the third point, we call your attention to the Minnesota shoreland management program. This program, which applies to the shores of surface water bodies and to stream side lands, has been cited by the Department of the Interior as constituting an adequate set of minimum requirements. We recommend that adequate county and local regulation septic systems and their effect on stream quality should be an obligatory part of the proposed programs and of similar Soil Conservation Service programs elsewhere.

Response 8

The sponsors and the Soil Conservation Service will continue to encourage the residents of the watershed to provide adequate treatment facilities to eliminate environmental problems. The regional plan calls for the construction of regional sewage facilities to prohibit degradation of water quality from untreated sewage entering waterways. The continued enforcement of the Pennsylvania Clean Streams Law by the Department of Environmental Resources will maintain water quality at acceptable levels.

The county health department has responsibility to monitor proper installation and maintenance of septic systems and enforce compliance with their standards.

Comment 9

Land treatment measures of types other than those discussed in the EIS seem to be needed in relation to this project:

Hedgerows. The lack of cover and of hedgerows in particular is noted in the EIS. The planting and protection of hedgerows should be among the land treatment measures incorporated in the Soil Conservation Service program in this, and in other, watersheds. Such hedgerows not only benefit wildlife, they also promote ecological diversity, which can decrease populations of pest species and decrease the need for pesticide application. They also have significant scenic attributes and may help to prevent erosion and decrease runoff turbidity.

Streamside Vegetation. The Soil Conservation Service should include the planting and protection of streambank vegetation, trees and native shrubs, as an integral part of its watershed management plan. Wooded streamside zone can decrease bank erosion, lower stream temperatures and contribute food (detritus, etc.) to stream ecosystems. It can significantly improve the stream productivity. It can also decrease turbidity by intercepting runoff. Furthermore, it would provide much needed wildlife cover and enhance the scenic properties of the stream. Such streambank vegetation should ideally be protected by public ownership or regulation.

Nutrient Control. The need for land treatment measures to limit nutrient levels in the inflow to the reservoirs was discussed previously.

Response 9

An entry citing 48,000 feet of hedgerow planting was inadvertently omitted from the table on page 9 of the Draft Environmental Statement. This table indicates the type of practices which will be used to adequately treat the watershed for sediment and erosion control. Nutrient control is occurring through the land treatment program described in the statement. Public ownership of flood plain properties is discussed in the Alternatives section of the Environmental Statement. The extent of the land treatment program has been discussed in the Final Environmental Statement. See also the Response to Comment 4.

Comment 10

Impoundment P.A. 659F on the North Fork of Cross Creek may be less than 100 feet above an abandoned mine. Should there be an abandoned mine

under that site, the pressure of the water in the impoundment could force a breakout of water to occur at a remote location such as along the Middle Fork of Cross Creek, leading to pollution of the streams by a slug of polluted mine water. If the area has not been checked for mine voids, it is recommended that a drilling program be started to determine if mine voids exist in the coal seam at the impoundment site.

Response 10

A thorough geologic investigation of the proposed dam foundation has been conducted. The Pittsburgh coal underlies all of the sites. The restriction of coal mining under the foundation to protect the proposed dams is cited on pages 22, 25, and 30 of the Draft Environmental Statement and thoroughly discussed on page 17 of the project work plan. The discussion of the "Structural Measures" portion of the"Planned Project" part of the "Description" section of the Final Environmental Statement has been enlarged to describe criteria for design due to coal underlying dam foundations.

Comment 11

We would appreciate an explanation of why the proposed dams must necessarily constitute barriers to fish passage. How could passage be provided and what advantages would its provision entail?

Response 11

The Soil Conservation Service realizes that the blocking of fish passage would be deleterious to the ecosystem in some watersheds but does not believe this to be the case in Cross Creek. The Pennsylvania Fish Commission in their comments on the work plan and environmenal statement state that "Since these (Cross Creek drainage system) are warm-water streams, the stream blocking will not have a serious detrimental effect."

Comment 12

What effect will intermittent flooding have on existing vegetation in the flood pools of the various structures?

Response 12

The sponsors have been maintaining vegetated flood pools in Pennsylvania reservoirs for almost 20 years. In addition to being erosionally stable, they provide opportunity for conjunctive land use for forestry, wildlife, recreation and even agriculture.

The dams are designed by the Soil Conservation Service to have a maximum time of 10 days to be completely drawn down. Thus, there is little or no damage to vegetation. When a very large flood occurs, minor damage to vegetation is a possibility due to siltation of leaves and stalks, but no plant fatalities would be expected. There would be no mud flats created by this short term inundation and the depth of sediment accumulation would be small.

Soil Conservation Service - Environmental Protection Agency Consultation

Soil Conservation Service personnel met with personnel of the Region III office of the Environmental Protection Agency on September 4, 1973, to discuss their comments on the draft environmental statement for the Cross Creek Watershed Project. Each comment made by EPA and the proposed responses by SCS in the final environmental statement were discussed. General agreement was reached on all points.

It was noted during the meeting that land in the flood plain is privately owned. The Soil Conservation Service provides technical assistance for and strongly encourages flood plain management in such areas. It was agreed that additional water quality data would be included in the final environmental statement.

The meeting provided many suggestions which improved the final environmental statement.

FEDERAL AGENCIES

U.S. Department of Health, Education, and Welfare

Comment 1

The U.S. Department of Health, Education, and Welfare reviewed the Draft Environmental Statement and had no comments.

Response

No response necessary

FEDERAL AGENCIES

U.S. Department of Commerce

Comment 1

The U.S. Department of Commerce reviewed the Draft Environmental Statement and had no comments.

Response

No response necessary

U.S. Department of Army

Comment 1

The U.S. Department of the Army considers the Draft Environmental Statement satisfactory.

Response

No response necessary

U.S. Department of Transportation

Comment 1

The U.S. Department of Transportation had no comments.

Response

No response necessary

9. List of Appendices

Appendix A - Comparison of Benefits and Costs for Structural Measures

Appendix B - Letters of Comment Received on the Draft Environmental Statement

Appendix C - List of Tables

Table 1 - Minimum Water Quality Standards

Table 2 - Existing and Proposed State Park Facilities, State Park Planning Area No. 7

Table 3 - Land and Water Resources Used for Each Site

Appendix D - Biological Survey of Headwater Portion of Cross Creek Watershed in Washington County, Pennsylvania - Edwin L. Cooper, Charles C. Wagner and William G. Kimmel, State College, Pennsylvania

Appendix E - Project Map

APPROVED BY Kenneth E. Grant DATE DEC 27 1973

Kenneth E. Grant
Administrator

APPENDIX A - COMPARISON OF BENEFITS AND COSTS FOR STRUCTURAL MEASURES

Environmental Statement, Cross Creek Watershed, Pennsylvania

(Dollars) [1]

Evaluation Unit	Damage Reduction	Changed Land Use Agr./Urban	Recrea-tion	Municipal Water Supply	Redevelop-ment	Second-ary	Total	Average Annual Cost	Benefit Cost Ratio
No. 1	78,930 [2]	3,440	177,750	7,900	16,600	26,980	311,600	210,800	1.5 to 1.0
PA-659F PA-660 PA-661 Rec. Fac. PA-662									
Project Adm.	-	-	-	-	-	-	-	14,500	-
GRAND TOTAL	78,930	3,440	177,750	7,900	16,600	26,980	311,600	225,300	1.4 to 1.0 [3]

1/ Price Base: Installation costs, 1970 - Benefits and O&M costs, 1969 adjusted normalized prices.

2/ In addition, it is estimated that land treatment measures will provide flood damage reduction benefits of $3,220 annually.

3/ Based upon 5-1/8% discount rate applicable when the plan was developed. The benefit-cost ratio is 1.5 to 1.0 based upon the discount rate of 6-7/8%, current normalized prices and current construction costs. This is in accordance with the Water Resources Council's Principles and Standards which became effective on October 30, 1973.

July 1971

Southwestern Pennsylvania
Regional Planning Commission
564 FORBES AVE., PITTSBURGH, PA. 15219 AREA CODE 412, 391-4120

April 16, 1971

Mr. R. M. Davis
State Conservationist
Soil Conservation Service
U. S. Department of Agriculture
Box 985
Federal Squares Station
Harrisburg, Pennsylvania 17108

Dear Mr. Davis:

This letter is written in response to your recent correspondence which transmitted to us a copy of the work plan for the Cross Creek Watershed in Washington County and requested our comment on the proposed project.

Our review notes that the project consists of three single purpose reservoirs for the storage of flood waters and one multi-purpose reservoir that will provide a 228 acre permanent lake on Cross Creek. In conjunction with the Cross Creek reservoir, a recreation facility will be developed which will include facilities for fishing, boating, picnicking and hiking. In addition to flood water storage and recreation, the reservoir will also provide a water supply for Avella and sediment storage for the upper portion of the Cross Creek Watershed. These four structures will control the run-off from approximately 21 square miles of the upper portion of the Cross Creek Watershed and will control 46 percent of the drainage area above the community of Avella, Washington County.

We are also aware of the fact that the multi-purpose reservoir proposed in the work plan will become an integral part of the Washington County Planning Commission's program to develop a 3,500 acre county park in this portion of the Cross Creek Watershed.

In our review, we find that the location of the proposed Cross Creek Reservoir corresponds with one of the sites included in the Southwestern Pennsylvania Regional Planning Commission's recreation plan that is currently being prepared. Therefore, we can endorse the proposed recreational use that is being planned for the Cross Creek Watershed.

Apparently, because the reservoir will be used as a water supply there was no reference made to swimming as part of the recreational development at the reservoir. Since swimming is an important outdoor recreation activity, some thought should be given to the inclusion of swimming facilities in Cross Creek Park.

Our review notes that the Cross Creek Reservoir will be used to provide a water supply to the community of Avella. This proposed plan to use the Cross Creek Reservoir for a water supply for the community of Avella is consistent with our Regional Water Systems Plan. Avella has had a serious shortage of water for years and the construction of this multi-purpose reservoir to provide a water supply for Avella appears to solve the community's water shortage problem in an economical manner.

We are aware, however, that once a water supply system is provided to a community in the southwestern Pennsylvania region it is necessary for that community to begin to think about providing sewer service to the densely settled areas of the community. This step is essential because the soils in southwestern Pennsylvania are not adequate to accommodate septic tanks. We note that you have designated that the Cross Creek Valley west of Avella as a portion of the drainage area that would benefit the proposed project. If the much needed water service for Avella is provided without a public sewer system, then we can anticipate environmental problems as a result of overflowing septic tanks. The overflowing septic tanks would eventually pollute the Cross Creek stream west of Avella. We suggest that as part of this project you commence to encourage the residents of Avella to plan to construct a sewer system project to eliminate the environmental problems that would be created by the provision of water service to the community. The provision of sewer service to Avella is recommended in the Regional Planning Commission's Regional Sewerage Plan.

In our review of the proposed projects we note that the multi-purpose dam to be constructed on Cross Creek will inundate eight archaeological sites (prehistoric indian camp sites). These archaeological sites have been identified by the Carnegie Museum. We have notified Donald Dragoo of Carnegie Museum of your plans to construct the multi-purpose reservoir on Cross Creek and we have suggested that he contact you if he feels that he would like more information about your plans. His address is c/o P. O. Box 28, Meridian Station, Butler, Pennsylvania 16001. The Carnegie Museum has identified a number of these sites throughout western Pennsylvania and close cooperation between the museum personnel and your agency would enable them to determine whether or not they are interested in undertaking excavations in the area prior to the time that the dam is constructed.

We have been in contact with the Washington County Planning Commission and they have advised us that the proposed project is consistent with the Washington County Planning Commission's policies and program and they are endorsing the proposed project.

As a result of our review of the work plan for the Cross Creek Watershed, we find that we can endorse the proposed project for the construction of four reservoirs (three flood control reservoirs and one multi-purpose reservoir) in the Cross Creek Watershed of Washington County.

If you have any questions on our comments and suggestions, please feel free to contact either myself or Alan Speak of our staff.

Sincerely,

Wm. R. B. Froehlich

Wm. R. B. Froehlich
Executive Director

WRBF/lb

cc: Robert P. DeLotto
Honorable John Mazza
A. B. Kenney
Louis Waller
Frank Longevitsh
John Anthony
Donald Dragoo

Deputy Administrator for
Watersheds

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-WS/83)
400 SEVENTH STREET SW.
WASHINGTON, D.C. 20590
PHONE: 202- 426-2262

3 JUL 1973

Mr. Kenneth E. Grant
Administrator
Soil Conservation Service
Department of Agriculture
Washington, D. C. 20250

Dear Mr. Grant:

This is in response to your letter of 24 May 1973 addressed to Admiral Bender concerning the draft environmental impact statement for the Cross Creek Watershed Project, Washington County, Pennsylvania.

The statement has been reviewed by the Department of Transportation. We have no comments to offer nor do we have any objection to the project.

The opportunity to review this statement is appreciated.

Sincerely,

J. D. McCANN
Captain, U. S. Coast Guard
Acting Chief, Office of Marine
Environment and Systems

UNITED STATES DEPARTMENT OF COMMERCE
The Assistant Secretary for Science and Technology
Washington, D.C. 20230

JUL 17 1973

Mr. Kenneth E. Grant
Administrator
Soil Conservation Service
U.S. Department of Agriculture
Washington, D.C. 20250

Dear Mr. Grant:

Thank you for your letter of May 24, 1973, to Secretary Dent, transmitting the draft environmental statement and watershed work plan of the Department of Agriculture on the Cross Creek Watershed, Pennsylvania, for Department of Commerce review.

This letter was directed to the attention of Dr. Sidney R. Galler, Deputy Assistant Secretary for Environmental Affairs. The Departmental review has been completed and we have no comment on the draft environmental statement and watershed work plan.

Sincerely,

Betsy Ancker-Johnson
Assistant Secretary for
Science and Technology

Cross Creek General 0-5

Box 985 Federal Square Station, Harrisburg, Pennsylvania 17108

April 22, 1971

Mr. Donald Dragoo
P. O. Box 28
Meridian Station
Butler, Pennsylvania 16001

Dear Mr. Dragoo:

Mr. William R. B. Froehlich, Executive Director of the Southwestern Regional Planning Commission, has informed us that you have an interest in archaeological sites in the Cross Creek Watershed, Washington County, Pennsylvania.

Enclosed for your information is a copy of the proposed work plan for the improvement of the water and related land resources of this watershed.

If you need more details on any of the proposals set forth in this plan, please feel free to contact me.

Sincerely,

R. M. Davis
State Conservationist

Enclosure
Proposed work plan

cc: B. Martin

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGION III
3535 MARKET STREET
PHILADELPHIA, PENNSYLVANIA 19101

OFFICE OF THE
REGIONAL DIRECTOR

MAILING ADDRESS
P.O. BOX 13716
PHILADELPHIA,
PENNSYLVANIA, 19101

August 6, 1973

RE: Suspense Ticket #1053

Mr. Kenneth E. Grant
U.S. Department of Agriculture
Soil Conservation Service
Washington, D.C. 20250

SUBJECT: Cross Creek Watershed, Pennsylvania Draft EIS and Work Plan

Dear Mr. Grant:

We have reviewed the above Draft Environmental Impact Statement in accordance with our area of jurisdiction and have no comments to offer.

Very truly yours,

John E. McKenna
Regional Environmental Officer

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

ER 73/735

AUG 8 1973

Dear Mr. Grant:

This is in reply to your letter of May 24, 1973, requesting our views and comments on a work plan and draft environmental statement for Cross Creek Watershed, Pennsylvania.

We have completed our review of the material and submit the following comments on the watershed work plan.

The proposed action would not affect any existing or proposed units of the National Park System, nor any site eligible for registration as a National Historic, Natural or Environmental Education Landmarks.

Although both the work plan and the environmental statement mention mineral occurrences in the project area, we believe the discussions are inadequate. The general and detailed maps do not show any mineral activity. The presence of the Pittsburgh coalbed and other deeper beds is mentioned but no mention is made of oil- and gasfields adjacent to the four reservoir sites. The environmental statement shows that coordination was established with local utilities to determine "costs and priorities of gas, electric, oil and waterline relocations," yet these facilities are not shown on the maps.

There are many abandoned wells throughout the Cross Creek Watershed. The flood pool area at each of the proposed sites should be thoroughly surveyed to locate and properly plug any abandoned holes. Otherwise unwanted water seepage into producing oil and gas horizons might result and pollution of the reservoirs might occur. Any future drilling of oil or gas wells within the watershed would not be affected by the project. The limestone and clay resources of the county are outside the project area.

At Site No. PA-660, oil and gas pipelines pass through the project area. Because of the proximity of the producing oil- and gasfields in this watershed, there may be smaller gathering lines that also will be affected by dam construction. A map should be included in the environmental statement showing all the oil and gas pipelines and the statement should mention if and how these lines will be affected by the project.

Under "Irreversible and Irretrievable Commitments of Resources" the environmental statement should indicate the resource loss involved with the commitment of the Pittsburgh coalbed under each damsite and flood pool.

The project, as understood at this time, appears to have potential for fish habitat development and increased fishing opportunities. However, the work plan does not present in sufficient detail the land treatment measures to be implemented. This lack of detail allows but a superficial assessment to be made on the project's effect on wildlife resources. In general, we find that the losses to wildlife can be minimized and mitigated only through stronger wildlife management measures which should be fully explored with the Pennsylvania Game Commission. It is anticipated, however, that even under the best coordinated approach to land management, the wildlife resource will suffer some damages.

Specific comments on the various sections of the work plan are as follows.

Description of Watershed - Fish and Wildlife Resource Data - Page 8

This section does not adequately describe the fish and wildlife resources of the watershed. The ruffed grouse, woodcock, mourning dove, raccoon, mink, muskrat, fox, and woodchuck should be added to the list of common species. Populations of these species are generally considered low to moderate in size; however, they do provide many recreational days of hunting.

Largemouth bass and bullheads should be added to the common fish species found in Cross Creek and its tributaries.

In addition to the lack of impoundment-type fisheries, it should be noted that no cold-water fishery exists in the watershed.

The estimated 35,000 fisherman-days on the 92-acre lake in the adjacent watershed appear to be excessive. The Ohio River Basin Comprehensive Survey lists 17 fisherman-days per acre.

The calculated usage in the Appalachian Report was 319 man-days per acre, which is unusually high. Both of these are short of the 380 man-days per acre estimated in the work plan.

Watershed Problems - Erosion and Sediment Damage - Page 10

The erosion of the mine spoil areas is a source of pollution and should be mentioned. Also, the substances making up the Norfolk and Western

Railroad fill should be identified and evaluated in terms of their possibilities as a source of pollution. The above may be more appropriate to "Problems Relating to Water Management - Water Quality" on page 12.

Problems Relating to Water Management - Fish and Wildlife - Page 11, Paragraph 2

We recommend that the last sentence of the second paragraph be changed to read, "In addition, there are no impoundments to satisfy area fishing demands."

Water Quality - Page 12

Comments made earlier for "Erosion and Sediment" are applicable for this section.

Project Formulation - Page 12, Paragraph 2

The Soil Conservation Service's goal of converting 2,300 acres of crop land to pasture is in direct opposition to the stated desires of the sponsors to improve wildlife resources (page 13), and the previous statement that an overabundance of grassland is a limiting factor to wildlife populations (page 11). If wildlife resources are to benefit by project implementation, stronger wildlife measures must be taken to keep populations at their present level of productivity. It is our understanding that the Pennsylvania Game Commission has offered to provide technical assistance to your agency and the local sponsors. It is suggested that land treatment measures be reevaluated, with the cooperation of the Pennsylvania Game Commission, to provide and improve wildlife habitat for the desired game populations.

Page 13, Paragraph 1

Undeveloped areas should not be protected for the purpose of development. They should be utilized for parks, recreational areas, and other uses compatible with periodic flooding. The residential development will create future flood problems, eliminating some of the benefits created by the project. Also, such development will have an adverse effect on wildlife resources through the loss of food and cover.

Page 13, Paragraph 5

The project impact on wildlife resources will result in the loss of approximately 450 acres through inundation, and an additional 2,300 acres will be altered due to changes in land uses. There is, therefore, reasonable doubt that wildlife populations will increase.

Works of Improvement to be Installed - Land Treatment Measures - Page 14, Paragraph 1

The work plan should include a table of proposed land treatment measures to be implemented, similar to Table 1A (page 39). The emphasis on conversion of lands to forage crops will have direct impact on wildlife values. The purpose of this table would enable the Fish and Wildlife Service and the Pennsylvania Game Commission to cooperate with your agency to develop specific measures to prevent anticipated losses, wholly or in part.

Structural Measures - Page 17, Paragraph 2

Although mineral rights and mining restrictions have been established as safety precautions for construction of the dams, the work plan does not recognize the vulnerability of the fishery habitat to future mineral developments. The possibility of purchasing mineral rights and/or prohibiting mining on all tributary streams entering the four impoundments should be investigated to prevent future acid mine drainage problems. Mining operations should also be prevented from interfering with recreational activities created by the project. This would include truck traffic involved in coal-hauling on roads in and near all recreational facilities.

Recreation Facility - Page 20, Paragraph 1

Due to the possible conflict of users, fishing versus other water recreation, it is suggested that the recreation-use plans include provisions for zoning of impoundments to minimize these conflicts.

In addition to possible conflicts with fishing, the recreational area should be zoned to provide compatible hunting uses.

Effects of Works of Improvement - Land Treatment - Page 25, Paragraph 1

Wildlife are natural resources and contribute to aesthetic qualities in the total environment. We believe, therefore, that this paragraph is misleading and should be revised.

Changed Land Use - Page 27

This statement makes it appear that the Soil Conservation Service is in land development rather than Watershed Protection and Flood Control business. To encourage development by the false security of a few impoundments is unwise and is contrary to flood plain zoning policy. Also, there is no mention of the approximately 2,750 acres of wildlife habitat to be lost. The proposed land uses will reduce the carrying capacity of the land, and the inundation of lands by the four

impoundments will cause a loss of 235 to 250 hunter-days annually. The Ohio River Basin Comprehensive and Appalachian Reports indicate 0.53 and 0.551 hunter-days per acre of small farm game habitat, respectively, are enjoyed in the watershed area.

Fish and Wildlife - Page 28, Paragraph 2

The wildlife habitat measures included in the project will partially compensate for the habitat losses incurred by impoundments and land conversion. It appears that wildlife populations will probably decline in many areas, due to increased residential development, reduction in grain production, and increased use of agriculture lands previously limited to periodic flooding. Therefore, unless there is a concentrated wildlife management effort, the potential of improved hunting quality is questionable.

Environmental Quality - Page 29, Paragraph 2

Flood plain zoning should be mentioned in this paragraph. It is time to start keeping people out of these areas, rather than encouraging development by giving them the false security of so-called flood protection devices.

Pages 29 and 30, Paragraph 3

Here, again, the work plan encourages flood plain development. On a flood control project, flood plain zoning should be the first consideration to discourage flood plain development of any kind not compatible with periodic flooding.

Project Benefits - Page 30, Paragraph 6

The improvement of wildlife habitat by the planned land treatment measures is questionable. The conversion of 2,300 acres of cropland to grassland, residential development, and the expanded use of agricultural lands, formerly restructed by flooding, will significantly reduce wildlife habitat. Until the Project Work Plan details the food and cover improvements, project benefits and adverse effects are speculative. However, in view of the previous land treatment measures (Table 1A, page 39) whereby only 310 acres were treated for wildlife habitat, the benefits claimed are not presently justified.

Provisions for Operation and Maintenance - Land Treatment Measures - Page 35

A statement should be added to indicate that wildlife resource development possibilities will be investigated by your agency and the Pennsylvania Game Commission.

Investigations and Analyses - Fish and Wildlife - Paragraph 3

If wildlife resources are to benefit by project construction, stronger wildlife management measures must be implemented to insure maintenance of populations at their present level of productivity.

The following comments are submitted for your consideration and use in preparing the final environmental statement for the project.

General Comments

The statement has not presented sufficient detail on the long-term effects of the project as they relate to wildlife resources. It is generally recognized that habitat deficiencies are a major limiting factor controlling wildlife populations. Although corrective measures for habitat inadequacies have been suggested to maintain satisfactory wildlife populations, the statement fails to point out how improvements will be realized. We feel that the proposed wildlife food and cover measures are not a wholly satisfactory substitute for the habitat lost to structural developments and land-use conversion. The benefits of these techniques remain to be analyzed. In the face of growing populations and intensive land changes the statement should put more emphasis on management of the surviving coverts, as these valuable areas are located in proximity to large human populations and are representative of fragile ecosystems already in short supply.

The multi-purpose impoundment is an important feature in enhancing the fishery resource and will serve to improve water quality and supply, as well as reduce the threat of flooding.

It is commendable that the draft environmental statement reflects consultation with the National Register of Historic Places and the Pennsylvania State Historic Preservation Officer. We note that it was determined that no sites listed or presently known to be eligible for listing in the National Register of Historic Places will be affected. However, we believe the environmental statement shows insufficient attention to cultural (historic, archeological, architectural) resources. Despite the consultations, it is evident that cultural resources have not been determined to be present or absent through a direct, interdisciplinary investigation of the project area. Accordingly, cultural values are not being fully considered during planning. The stated intention to notify the National Park Service and the Pennsylvania State Historic Preservation Officer before development begins may result in some mitigation for cultural values previously undetected, but the environmental statement is indefinite on that point. It does not affirm that any positive action will follow notification of those agencies.

Cultural resources in the affected environment should be investigated by persons professionally trained to locate, identify, and evaluate them. The results of that investigation should be reflected in all portions of the environmental statement, so that cultural values are substantively described as environmental resources, project effects assessed, appropriate mitigating measures developed, and unavoidable adverse effects and any irreversible and irretrievable commitments of cultural resources accounted for.

Subsidence due to subsurface mining of coal appears to have been adequately considered and necessary protective measures have been taken. Significant adverse environmental impact related to the geology of the area of the proposed project is not anticipated.

From a hydrology standpoint, the statement is reasonably adequate and accurate in its evaluation of the environmental impact of the proposed action, and we believe there should be no adverse effect on the water resources of the region.

Specific comments on the various sections of the statement are as follows:

Summary Sheet - Summary of Environmental Impact and Adverse Environmental Effects - Page 2, Sentence 2

We recommend that "Improve wildlife habitat . . . ." be changed to read, "Maintain wildlife habitat . . . ."

Environmental Setting - Fish and Wildlife - Page 4, Paragraph 1

This introductory paragraph should contain the primary game fish found in Cross Creek and its tributaries.

Page 7, Paragraph 1

Omit the last sentence and add: "No rare and endangered fish or wildlife species are present in the Cross Creek Watershed."

Water and Related Land Resource Problems - Fish and Wildlife - Page 14, Paragraph 2

Land treatment practices listed do not include wildlife habitat improvements. It should also be noted that the Pennsylvania Game Commission will provide technical assistance to this aspect of the program. We emphasize that habitat quality must be improved in order to maintain existing supply levels in light of the reduction in wildlife habitat resulting from this project. As in agriculture, the remaining wildlife habitats should be managed so as to produce a larger crop on a smaller area.

Structural Measures - Page 16, Paragraph 6

Although mineral rights will be acquired as safety features for the dam, the statement does not recognize the vulnerability of the fishery habitat to future mineral developments. It is recognized that the influence of acid mine water presently is negligible, due to the alkaline headwater stream (page 8). However, it is felt that purchase of mineral rights or restriction of mineral exploitation on the headwaters should be considered to prevent acid mine pollution problems in the future. Mining operations should also be prevented from interfering with recreational activities created by the project.

Page 17, Paragraph 3

Eventual installation of a sewage system is planned for the recreational facility, but the statement acknowledges that no public sewage treatment facilities exist (page 15). As this sewage is a possible pollutant to tne recreational lake and downstream reaches, more detailed procedures or planning is necessary for assessment.

Page 18, Paragraph 2

Comments, as above, are applicable to processing of employee waste during the construction phase.

Page 18, Paragraph 4

Flood plain zoning should be recommended to prevent further flood plain development expected to result from the project (page 19).

Environmental Impact - Fish, Wildlife and Recreation - Page 22, Paragraph 3 and 4

The pattern of land use in the project is toward increasing pasture lands and toward pole stage and saw-log stage forests. This trend indicates a general decline in small game habitat. In the face of growing populations and intensive land use, more emphasis must be placed on managing the remaining habitat.

Favorable Environmental Effects - Page 24, Paragraph 3

The increase in wildlife habitat through land treatment is not necessarily certain. The conversion of 32 percent of the cropland deprives many species of their primary food sources. Therefore, it is suggested that "maintain" rather than "increase" be used to more appropriately describe the effects of this water project.

Alternatives - Land Treatment and Recreation Only - Page 26

The statement, "Benefits to water quality, wildlife mitigation, and flood prevention would be foregone" appears to be an over-simplification. These benefits would be lessened.

Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity - Page 29, Paragraph 2

In light of the foregoing comments, we suggest modification of the first sentence to read, ". . . improvement of water quality and the quality of wildlife habitat."

We wish to thank you for the opportunity to review the work plan and the draft statement for the Cross Creek Watershed.

Sincerely yours,

Deputy Assistant Secretary of the Interior

Mr. Kenneth E. Grant
Administrator
Soil Conservation Service
U.S. Department of Agriculture
Washington, D. C. 20250

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
HARRISBURG, PA. 17120

THE SECRETARY

August 31, 1973

Mr. Kenneth E. Grant
Administrator
Soil Conservation Service
U. S. Department of Agriculture
Washington, D. C. 20250

Dear Mr. Grant:

The State Conservation Commission is pleased to have the opportunity to review and comment on the work plan for the Cross Creek Watershed in Washington County, Pennsylvania and on the accompanying Environmental Impact Statement for the Cross Creek Watershed. We accepted and approved the application for assistance from the potential project sponsors of this project in August of 1964. The program, as outlined at that time, was designed to mitigate damages attributed to flooding in rural communities within this watershed during various previous periods of history. Most notable was the flood of 1912 that claimed seven lives and did substantial damage to property, roads and public utilities.

You may wish to refer to comments made by letter on April 16, 1971, that I made to Mr. R. M. "Mel" Davis, then State Conservationist for Pennsylvania, that responded to a request for input to the work plan in its draft form. It was noted at that time that there was definite need for both water supply storage and for recreational development fully justified as reflected in studies conducted by a private consultant and by the Department of Forest and Waters' (Department of Environmental Resources as of January, 1971) Outdoor Recreational Horizons Report.

The work plan outlined a very important land treatment program that is designed to significantly contribute to the reduction of erosion and sedimentation within the watershed and for a resulting positive effect on water quality in Cross Creek. The estimated cost of installation of conservation treatment measures to install the full land treatment program will be $460,000. The Conservation Commission fully concurrs that this type of conservation treatment program should and must be installed to fully appreciate all the benefits from this project as proposed. The Washington County Conservation District has supported in their long range plans a scheme for accelerating land treatment in the Cross Creek Watershed area in order to meet the seven year installation schedule of the Watershed Work Plan.

Since the Rural Environmental Assistance Program has been eliminated from the USDA's program, cost-sharing will not be available to assist land owners in the accelerated installation of conservation treatment measures. Under Title II of the Rural Development Act of 1972, there is a provision to make available to landowners, through 10 year agreements with the Soil Conservation Service, cost-sharing for the installation of conservation practices needed to fulfill the work plan requirements of watershed projects. I hope the Federal Government will provide the vehicle to implement this provision of the Rural Development Act. This act also provides for cost-sharing of water supply features under P. L. 566 to provide for the present and future water supply needs of rural communities. The Independence Township Municipal Authority has projected expanded water supply needs to meet the future water demands of both residential and recreational development use.

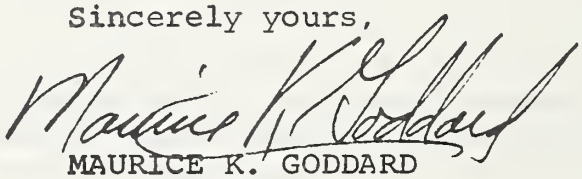
The Soil Conservation Service should be commended for the improved detail and format in presenting the Watershed Work Plan for the Cross Creek Watershed. The explanations provided and the methodology used to gather and analyze data, makes the review process easier for those agencies asked to provide this service.

Hurricane Agnes, experienced rather severly in Pennsylvania in 1972, pointed out the importance of good balanced flood control programs and the protection that they can provide to all the citizens of this Commonwealth. It is hoped that undeveloped areas on the flood plain in Cross Creek, because of the increased protection provided by the installation of the works of improvement, will not be used for intensive commercial, industrial or residential development on the flood plain without due consideration of good flood plain management techniques. In the past, protection afforded by flood control projects have been compromised because of increased construction on the flood plains that can later suffer extensive damage from future, larger floods.

The Environmental Impact Statement that has been prepared is most complete. It has pointed out both the positive and negative environmental impacts. Specific comments have already been provided to the Soil Conservation Service through the Pennsylvania Clearing House and you may wish to refer to them.

It is hoped by all our commission members that the Cross Creek Project will receive speedy, favorable congressional action in order that project installation can begin.

Sincerely yours,



MAURICE K. GODDARD
Chairman

APPENDIX C, TABLE 1 - MINIMUM WATER QUALITY STANDARDS
FOR CROSS CREEK WATERSHED 1/
Environmental Statement, Cross Creek Watershed, Washington County, Pa.

pH

Not less than 6.0 and not more than 8.5.

Dissolved Oxygen

Minimum daily average 5.0 mg/1; no value less than 4.0 mg/1.

For lakes, ponds and impoundments only, no value less than 4.0 mg/1 in the epilimnion.

Iron

Total iron not more than 1.5 mg/1.

Temperature

Not more than a 5^{o} F. rise above ambient temperatures or a maximum of 87^{o} F., whichever is less, not to be changed by more than 2^{o} F. during any one-hour period.

Dissolved Solids

Not more than 400 mg/1 as a monthly average value;
not more than 750 mg/1 at any time.

Bacteria

For the period May 15 through September 15 of any year, not more than 1,000/100 ml as an arithmetic average value;
not more than 1,000/100 ml in more than two consecutive samples;
not more than 2,400/100 ml in more than one sample.

For the period September 16 through May 14 of any year, not more than 5,000/100 ml as a monthly average value, nor more than this number in more than 20 percent of the samples collected during any month, nor more than 20,000/100 ml in more than 5 percent of the samples.

1/ Standards of the Pennsylvania Department of Environmental Resources.

APPENDIX C, TABLE 2
EXISTING AND PROPOSED STATE PARK FACILITIES
STATE PARK PLANNING AREA NO. 7
Environmental Statement
Cross Creek Watershed, Washington County, Pennsylvania

PARK	ACRES			FACILITY		
	LAND	WATER	TOTAL	PICNIC TABLES	TRAILER & TENT SITES	SWIMMING CAPACITY
Crooked	2,130	350	2,480	1,000	300	2,500
Keystone	729	78	807	1,260	290	6,000
Linn Run	560		560	318	100	1,000
Point	36		36			
Raccoon Creek	6,808	101	6,909	975	440	6,000
Hillman	3,654		3,654	1,000		
Laurel Mountain	493		493			
Moraine	12,696	3,225	15,921	2,350	500	12,000
Ohiopyle	18,483		18,483	1,000	500	
Ryerson Station	1,043	61	1,104	190	100	1,000
Yellow Creek	2,122	700	2,822	800	200	1,600
Total 1980 Supply	48,754	4,515	53,269	9,893	2,430	30,100
Total 1980 Demand			67,585	9,910	4,191	56,331
Reserve			0	0	0	0
Need			14,316	17	1,761	26,231

From: Outdoor Recreation Horizons, Pennsylvania Department of Forests and Waters, Commonwealth of Pennsylvania, 1970.

GOVERNOR'S OFFICE
OFFICE OF STATE PLANNING AND DEVELOPMENT
COMMONWEALTH OF PENNSYLVANIA
HARRISBURG, PA. 17120

July 26, 1973

Mr. William C. Fecke, III
U. S. Department of Agriculture
Soil Conservation Service
Box 985
Federal Square Station
Harrisburg, Pennsylvania 17108

Dear Mr. Fecke:

The Office of State Planning and Development, as the State Clearinghouse for the Commonwealth of Pennsylvania has received and transmitted to other various State agencies copies of the Draft EIS for the Cross Creek Watershed Project (PSCH No. 73-06-3-001).

Attached to this letter please find comments from the Pennsylvania Departments of Commerce, Environmental Resources and Transportation. Please consider these the official response of the Commonwealth of Pennsylvania in this matter.

Sincerely,

Richard A. Heiss

Richard A. Heiss, Coordinator

RAH/rew
Enclosures

June 18, 1973

PSCH Project No. 73-06-3-001
(Cross Creek Watershed Project, Washington County)

Richard A. Heiss, State Coordinator
Office of State Planning and Development

E. S. Hochstetter, Director
Bureau of State and Federal Economic Aid

This is to respond to your subject memorandum of June 7, 1973, requesting our review and comments concerning the subject project.

This is to advise that we have no particular comments to make concerning this project but that we are in general favor of the project as outlined in the proposal.

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL RESOURCES
P. O. BOX 1467
HARRISBURG, PENNSYLVANIA 17120

July 9, 1973

SUBJECT: Department of Environmental Resources
Review and Evaluation of
PSCH No.: 73-06-3-001
Title: Cross Creek Watershed Project DEIS
Location: Washington County

TO: Richard A. Heiss, Coordinator
Pennsylvania State Clearinghouse
Governor's Office of State Planning
and Research

FROM: MAURICE K. GODDARD
Secretary of Environmental Resources

The aforementioned has been reviewed by the Department of Environmental Resources.

Submitted Draft EIS for the proposed project is granted clearance on condition that the requirements mentioned in the attached Review and Evaluation Report, are met.

This evaluation is based strictly on the data submitted and actions as proposed. Our reply does not extend automatically to any changes considered minor or to the time framework as proposed. A re-evaluation of any such changes will be necessary as soon as data can be submitted by the applicant. This information should be submitted by the applicant directly to the State Clearinghouse.

DEPARTMENT OF ENVIRONMENTAL RESOURCES
SUMMARY OF REVIEW AND EVALUATION

PSCH No.: 73-06-3-001

Title: Cross Creek Watershed Project DEIS

Date: July 9, 1973

Location: Washington County

The Department of Environmental Resources has reviewed the proposed project and has the following comments:

1. The project is approved for funding and implementation.

2. The Department of Environmental Resources retains an interest in this project and environmental effects encountered or anticipated in the further development of this project.

3. Benefits to flood control are attributed to the reduction of damage to the railroad. I question if long-term benefits from this source can be claimed for this project. There are no industries in the area and no railways passenger service to offer. There is a serious question whether this railroad line will remain in operation for a significant amount of time.

4. There is a statement that storage be provided for low flow augmentation as required by the Department of Environmental Resources. This is to clarify the language and to indicate that DER requires minimum riparian releases from water-taking points and dams which might use or completely shut off the flows in the stream. This action does not necessarily entail low flow augmentation, which is an increase of natural streamflow provided by draft or storage. The specific release requirements for this particular structure would have to be reviewed in detail upon receipt of application.

5. The environmental impact statement claims that there will be improvements to benthos and fish life below the dam. Our experience in examining streams below impoundments indicates a reduction in the diversity of benthos. Dominant populations consist of caddis flies with black flies frequently present in abundance. There is usually an absence of may flies and stone flies which are found in unobstructed streams. In some cases, this condition may increase the over-all standing crop, but the diversity and food availability in the food chain is diminished. The apparent improvement of fisheries is thought to be due partially to the obstruction and accumulation of fish below the obstruction as they are stopped in their normal upstream migrations.

6. The statement claims improvement of water quality due to reduced sediment discharges. Sediment discharges are reduced by erosion control practices on the land and by controlling peak flows in streams to reduce bank erosion. It is not clear whether the thrusts of the erosion control program will be only above the dam, or more or less uniform on a watershed-wide basis. To protect the stream below the dam, accelerated erosion control is needed there also.

7. The statements relating to the Independence Township Municipal Authority are well taken. This authority has suffered frequent and prolonged water shortages. Installation of a reliable source should help to alleviate this problem.

8. The Cross Creek Watershed is extremely underlain by a major coal deposit, the Pittsburgh coal seam. This represents an important economic resource for the area, and even more important in this time of energy shortages. The Draft Environmental Statement recognizes the existance of the Pittsburgh coal on page 2 but fails to consider the impact of the project on the coal and the impact of the coal on the project.

9. As stated on page 51 of the work plan for Cross Creek Watershed which is issued by the U.S. Soil Conservation Service, each of the proposed dam sites and lake impoundments is underlain by the Pittsburgh coal. In as much as the depth of the coal at each location is not very great, to build the dams and impoundments would likely mean that the coal not be mined out from under each of the dam and lake sites. If they were to try to mine the coal, it could cause sufficient subsidence, even with pillars, to result in leakage or flooding into the coal mines. Furthermore, the subsidence would also be a hazard to the structural soundness of the dams and the net result, therefore, would be that the coal probably could not be mined under the dam and lake areas resulting in a loss of this valuable coal reserve.

10. We have no indication of oil and gas production in the immediate facilities. However, a careful search should be made of the records to see if any deep oil or gas wells were ever drilled under the proposed impoundment sites since such well holes in the past were often left unplugged, resulting in salt-water seepage from below.

11. The "Work Plan" for the subject study was reviewed by various Divisions of D.E.R. in April 16, 1971. This Draft EIS appears to be for the same plan which we endorsed in April 1971.

12. In 1971 we were concerned about the cost of mineral rights from our experience with the proposed Buffalo Creek Site. Page 30, paragraph 3, indicates that mineral rights have been purchased.

13. A watershed map would have been helpful during the review of the subject statement. We should suggest, as a general policy, that a map should be included as part of the statement.

PSCH No.: 73-06-3-001
July 9, 1973

The subject report has been reviewed by the Pennsylvania Fish Commission and they wish to make the following remarks regarding it:

1. The damage figures are based on the 1912 flood which was a good bit greater than the 100 year flood against which the project is designed to protect. The 1912 flood had a flow of 16,000 cfs while the 100 year flood would be only 13,000 cfs. The damage figures for this flow could be very much lower than for the 1912 flood. Even though they use a damage reduction figure in estimating B/C ratio, these figures are misleading.

2. There are no flows given for any of the dam locations. For a project that was authorized for planning in February of 1965, there has been plenty of time to install a few weirs and accumulate some flow records.

3. The recreation lake (PA 661) should provide aquatic recreation facilities in an area where they are needed. Since these are warmwater streams, the stream blocking will not have a serious detrimental effect. The three smaller pools (5, 8 and 8 acres) cannot be expected to provide any sustained yield of game fish; however, PA 661, with a 228 acre recreation pool, could be managed to provide satisfactory fishing. As stated in the report, aquatic weed control could be a problem in this lake, so there should be provisions to allow lowering the lake at least five feet over winter as needed for weed control.

4. Overall, the Pennsylvania Fish Commission concurs with the project and would be willing to manage the fishery in PA 661 if requested to do so.

OA-501 12-67 COMMONWEALTH OF PENNSYLVANIA

Department of Transportation

July 6, 1973

SUBJECT: Draft Environmental Impact Statement
Cross Creek Watershed
Washington County
PSCH Project No. 73 06 3 001

TO: Mr. Richard A. Heiss
State Coordinator, PNRS
Office of State Planning
and Development

FROM: Louis E. Keefer, Director
Bureau of Advance Planning

Early last year our Engineering District Office reviewed the Cross Creek Watershed Work Plan as requested by the U.S. Soil Conservation Service. A copy of that review is enclosed. The review comments provided then are still valid today.

We suggest that a discussion of the impact of the proposed watershed development on the existing state highway facilities in the area be included in the Environmental Impact Statement. We expect that the enclosed comments will be given full consideration in this impact discussion.

Enclosure

TICKLER DATE _____

DEPARTMENT OF TRANSPORTATION
Uniontown, Pennsylvania
January 7, 1972

Washington County
Cross Creek Watershed
Work Plan

W. S. Lawrence, P.E., Assistant Chief Engineer
Bureau of Design

J. H. Mifflin, P.E., District Engineer
District 12-0

We have reviewed the work plan for Washington County's proposed flood control projects in the Cross Creek Watershed and offer the following comments.

The proposed improvements will necessitate the inundation of portions of the following legislative routes:

L.R. 62185
L.R. 62024
L.R. 62035
L.R. 62133
L.R. 62022

The work plan proposes that a section of L.R. 62185 be raised to prevent inundation while portions of L.R. 62024, L.R. 62035 and L.R. 62133 are to be relocated. These proposed changes should not pose any serious transportation problems.

Plans for the main reservoir (PA-661) however indicate that present L.R. 62022 and L.R. 62133 are to be abandoned. A proposed county park road will connect L.R. 62133 north of the dam to L.R. 62022 east of the park but portions of L.R. 62022 and L.R. 62133 will be severed. This results in a loss of a north-south traffic artery between Traffic Route 844 at West Middletown and Traffic Route 50 to the north. Consideration should be given to the possible relocation of this facility.

It is our understanding that any costs associated with the necessary changes in the state highway system will be borne by the Sponsoring Local Organization and the Soil Conservation Service, and not by the Department of Transportation.

FILE

TICKLE DATE_____

DEPARTMENT OF TRANSPORTATION
Uniontown, Pennsylvania
January 7, 1972

Fayette County
Cross Creek Watershed
Work Plan

W. S. Lawrence, P.E., Assistant Chief Engineer
Bureau of Design

J. H. Mifflin, P.E., District Engineer
District 12-0

-2-

We suggest that the Soil Conservation Service coordinate the proposed highway system changes with the Department as soon as possible.

We are returning your copy of the project work plan as you requested.

JPL/bw

CC: District Reading File thru: J. H. Mifflin, P.E.
H. N. Harper, P.E.
T. H. Lyons, P.E.
J. P. Logan, P.E.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
6TH AND WALNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

July 31, 1973

Mr. Kenneth E. Grant
Administrator
Soil Conservation Service
U.S. Department of Agriculture
Washington, D.C. 20250

Subject: Draft Environmental Impact Statement (EIS) for Cross Creek Watershed Project, Washington County, Pennsylvania. (USDA-SCS-ES-WS-(ADM)-73-48(D))

Dear Mr. Grant:

We have completed our review of the draft EIS on the above subject. For the most part, we feel that this is an excellent EIS and the project has the potential for a positive contribution to environmental quality. However, we do have some reservations concerning certain environmental side-effects of this project. We feel that modifications might well be desirable to avoid some clearly identified environmental problems.

Executive Order No. 11296, August 10, 1966, requires Federal agencies to "provide leadership in encouraging broad and unified effort to prevent uneconomic uses and development of the Nation's flood plains and, in particular, to lessen the risk of flood losses in connection with Federal lands and installations and Federally financed or supported improvements." The responsibility imposed by this Executive Order and our mandated concern for the water quality consequences of flood damage require us to take an active interest in flood control. Experience has shown that unwise use of flood plain lands can incapacitate sewage treatment and water supply facilities and can result in the release of municipal and industrial waste materials to water courses leading to health hazards and the degradation of environmental quality.

To preclude any possibility of project induced flood damage, EPA requests the SCS to institute a requirement for local cooperation in the form of a commitment to institute appropriate planning and zoning measures for flood hazard areas and to participate in the Federal Flood Insurance Program. The commitment of county and municipal authorities to institute these measures should be secured prior to implementation of the structural flood control measures.

Present stream quality should be more fully and quantitatively documented. Nutrients, temperature, coliforms and parameters related to mine drainage as well as suspended solids are of special interest.

Water quality in parts of the watershed may not presently meet the minimum water quality criteria listed in Table 1, Appendix C of this Environmental Statement. The North Fork of Cross Creek near Avella, Pennsylvania had a pH of 3.7, a hardness content of 1600 mg/1, a sulfate content of 1140 mg/1, and a total iron content of 7.5 mg/1 when sampled in 1967 by the Federal Water Quality Administration. Cross Creek was sampled at the State line during this same survey and was found to have a pH of 6.5, a hardness content of 920 mg/1, a sulfate content of 1020 mg/1, and a total iron content of 3.0 mg/1. It is inferred from this data that the Pennsylvania Minimum Water Quality Standards (DER) for Cross Creek Watershed are not currently being met in all of the watershed. Specific violations appear to occur in pH, Iron and Dissolved Solids limits.

Eutrophication of the recreational water body PA-661 could destroy much of its value for recreation. Before constructing this structure a nutrient abatement program should be developed for its tributary area. Runoff of nutrients from agricultural use of fertilizers and disposal of animal wastes will have to be addressed. Commitments on the part of the local authorities and the individuals affected as needed to implement such a program should be secured prior to the commitment of Federal funds for construction. Since the other proposed structures also have permanent pools, nutrient runoff from their watersheds may also need to be abated.

Since a major project purpose is to abate turbidity and since nutrients are often bound to suspended particles, the final EIS should consider the effect on nutrient levels of the proposed program. Turbidity decreases may also promote more complete utilization of dissolved nutrients by promoting increased photosynthesis. Conceivably the stream channels could become choked with aquatic vegetation. This point should be discussed.

The nature and extent of mine related water quality problems should be documented. The need for measures to abate erosion or acid mine drainage should be identified. It may be that such measures are needed to complement the program proposed so that its full potential can be realized.

Contrary to assertions in the project report, on-site sewage disposal need not contribute to water quality degradation. However, it often does. Such degradation should be prevented to protect water supplies, aquatic biota and the recreational utility of the basin's water resources. This involves 1) adequate standards for construction and maintenance of septic tanks, sand filters, chlorination facilities, drain fields, etc. as may be required; 2) adequate enforcement of the standards and reasonably frequent inspection; and 3) land use restrictions to prevent too great a density of such on-lot wastewater systems and to prevent siting drainfields in areas having inappropriate soil conditions (permeability, slope and water table height) or too close to water bodies or streams. Regarding the third point, we call your attention to the Minnesota shoreland management program. This program, which applies to the shores of surface water bodies and to stream side lands, has been cited by the Department of the Interior as constituting an adequate set of minimum requirements. We recommend that adequate county and local regulation of septic systems and their effect on stream quality should be an obligatory part of the proposed programs and of similar SCS programs elsewhere.

Land treatment measures of types other than those discussed in the EIS seem to be needed in relation to this project:

Hedgerows. The lack of cover and of hedgerows in particular is noted in the EIS. The planting and protection of hedgerows should be among the land treatment measures incorporated in the SCS program in this, and in other, watersheds. Such hedgerows not only benefit wildlife, they also promote ecological diversity, which can decrease populations of pest species and decrease the need for pesticide application. They also have significant scenic attributes and may help to prevent erosion and decrease runoff turbidity.

Streamside Vegetation. The SCS should include the planting and protection of stream bank vegetation, trees and native shrubs, as an integral part of its watershed management plan. A wooded streamside zone can decrease bank erosion, lower stream temperatures and contribute food (detritus, etc.) to stream ecosystems. It can significantly improve the

stream productivity. It can also decrease turbidity by intercepting run-off. Furthermore it would provide much needed wildlife cover, and enhance the scenic properties of the stream. Such stream bank vegetation should ideally be protected by public ownership or regulation.

Nutrient Control. The need for land treatment measures to limit nutrient levels in the inflow to the reservoirs was discussed previously.

Impoundment P.A. 659F on the North Fork of Cross Creek may be less than 100 feet above an abandoned mine. Should there be an abandoned mine under that site, the pressure of the water in the impoundment could force a breakout of water to occur at a remote location such as along the Middle Fork of Cross Creek, leading to pollution to the streams by a slug of polluted mine water. If the area has not been checked for mine voids, it is recommended that a drilling program be started to determine if mine voids exist in the coal seam at the impoundment site.

We would appreciate an explanation of why the proposed dams must necessarily constitute barriers to fish passage. How could passage be provided and what advantages would its provision entail?

What effect will intermittent flooding have on existing vegetation in the flood pools of the various structures?

We have classified our comments in EPA Reporting Category ER-2, indicating that EPA has reservations concerning the environmental effects of certain aspects of the proposed action and believes that the draft EIS does not contain sufficient information to assess fully the environmental impact of the proposed project. The classification and the date of EPA's comments will be published in the Federal Register in accordance with our responsibility to inform the public of our reviews on proposed actions under Section 309 of the Clean Air Act.

Sincerely yours,

Robert J. Blanco

Robert J. Blanco, P.E.
Chief
Environmental Impact Branch

cc: CEO

DEPARTMENT OF THE ARMY
OFFICE OF THE UNDER SECRETARY
WASHINGTON, D.C. 20310

1 AUG 1973

Honorable Robert W. Long
Assistant Secretary of Agriculture
Washington, D. C. 20250

Dear Mr. Long:

In compliance with the provisions of Section 5 of Public Law 566, 83rd Congress, the Administrator of the Soil Conservation Service, by letter dated 24 May 1973, requested comments on the Watershed Work Plan and Draft Environmental Statement for the Cross Creek Watershed, Washington County, Pennsylvania.

We have reviewed the work plan and foresee no conflict with any projects or current proposals of this office. The draft environmental statement is considered satisfactory.

Sincerely,

Charles R. Ford

Charles R. Ford
Acting Special Assistant to the
Secretary of the Army (Civil Functions)

Southwestern Pennsylvania
Regional Planning Commission
564 FORBES AVE., PITTSBURGH, PA. 15219 AREA CODE 412, 391-4120

August 3, 1973

Mr. Benny Martin, State Conservationist
U. S. Department of Agriculture
Soil Conservation Services
Box 985 - Federal Square Station
Harrisburg, Pennsylvania 17108

Dear Mr. Martin:

This letter is written in response to your correspondence requesting the Southwestern Pennsylvania Regional Planning Commission (SPRPC) to provide a review and comment on the Draft Environmental Statement for the Cross Creek Watershed project.

We understand that this notification responds to the Intergovernmental Cooperation Act of 1968 as implemented by the Office of Management and Budget's Circular A-95 Revised, which requires that the metropolitan clearinghouse (SPRPC) and the state clearinghouse (Office of State Planning and Development) be notified about applications seeking federal financial assistance.

As you know, this Commission previously provided a favorable review of the work plan for the Cross Creek Watershed project in our letter of 16 April 1971, a copy of which is enclosed.

In our review of the Draft Environmental Statement we have noted that the greater part of the Statement is a recapitulation of material contained in the work program because the nature and purpose of the proposed project is to improve the natural environment. Comparatively little space is given to adverse environmental effects. While we agree that the adverse effects such as loss of land or inundation of land due to impoundment of water are minor compared to the benefits to be achieved by the project, we would again call to your attention two points raised in our review of the work program:

1. availability of public water to Avella from the proposed multi-purpose reservoir accentuates the need for the early planning and construction of sewage facilities in order to avoid the environmental problems that would be created by the provision of water service to the community and the continual use of on lot sewage disposal facilities; and

2. eight archeological sites will be inundated by construction of the multi-purpose dam to be constructed on Cross Creek. See page two, paragraph three of our letter of April 16, 1971. (Page eight of the Draft Environmental Statement states that: "There are no other known areas of archeological or historical value...").

In addition, we recommended in our review of the work plan that "some thought should be given to the inclusion of swimming facilities in Cross Creek Park." The Draft Environmental Statement, in enumerating the recreational benefits of the proposed project, does not give any indication that consideration has been given to this recommendation or to the other two points enumerated above.

Consistent with the procedures in Circular A-95 of the Office of Management and Budget, we have notified the elected officials of the Townships of Cross Creek, Hopewell and Independence about the proposed project. No comments were received.

The Draft Environmental Statement has been favorably reviewed by the Washington County Planning Commission. A copy of their letter is enclosed.

As a result of our review, we find that we can endorse the Draft Environmental Statement for the Cross Creek Watershed with the provision that in its final form, the Statement deal with the points enumerated above.

Sincerely,

Wm. R. B. Froehlich

Wm. R. B. Froehlich
Executive Director

WRBF:HAS:dlp
Enclosures

cc: Peter O. Steege
Robert P. DeLotto
Orlando Capretto
Frank Longevitsh
William Sember
Donald Dragoo
Mary Jo Brown
Robert Hamilton
Mildred Ostop

APPENDIX C, TABLE 3 - LAND AND WATER RESOURCES USED FOR EACH SITE

Environmental Statement, Cross Creek Watershed, Washington County, Pa.

	Unit	PA-659F	PA-660	PA-661	PA-662	Total
Total Area Required for each site	Ac.	36	63	320	59	478
Flood Pool Area	Ac.	27	57	311	52	447
Sediment Pool Area	Ac.	5	8	-	8	21
Recreation Pool Area	Ac.	-	-	228	-	228
Water Supply Pool Area	Ac.	-	-	258	-	258
Additional Area Temporarily Flooded (flood pool)	Ac.	22	49	53	44	168
Est. Structure and Spillway Area	Ac.	9	6	9	7	31
Stream Length Covered by Structure	Ft.	220	375	475	300	1,370
Stream Length Replaced by Sediment Pool and Other Permanent Pools	Ft.	1,000	1,000	9,600	1,400	13,000
Height of Structure	Ft.	35	61	74	46.5	-
Volume of Fill	Cu. Yd.	70,000	158,400	340,500	77,800	646,700
Drainage Area	Sq. Mi.	1.84	4.39	11.0	3.72	20.95

Note: Recreation Facilities located at PA-661 will require an additional 3,500 acres.

APPENDIX D - BIOLOGICAL SURVEY OF HEADWATER PORTION OF CROSS CREEK WATERSHED IN WASHINGTON COUNTY, PENNSYLVANIA

BY

EDWIN L. COOPER

CHARLES C. WAGNER

WILLIAM G. KIMMEL

STATE COLLEGE, PENNSYLVANIA

SEPTEMBER 1972

APPENDIX D

Biological Survey of Headwater Portion of Cross Creek Watershed in Washington County, Pennsylvania.

Edwin L. Cooper, Charles C. Wagner and William G. Kimmel
State College, Pennsylvania

Introduction

The U. S. Soil Conservation Service has agreed to assist local sponsoring agencies in the design and construction of four water-control structures in the Cross Creek Watershed for the purposes of alleviating flood damage, providing water supply, and providing water-oriented recreation for people in this area.

The purposes of this biological survey were (1) to obtain current information on water quality, benthic invertebrates and fishes in this watershed, and (2) to interpret the biological information in terms of the impact that these water control structures might have on the aquatic ecosystem.

The locations of the four structures and the sampling stations are identified on the project map (Figure 1) taken from the SCS Work Plan for Cross Creek Watershed dated July 1971. More exact locations of these sites are noted on the four USGS topograph maps appended to this report (Appendix A) and are described in Table 1.

The field work was done during the period 15-22 August 1972. Data on the four structures (Table 2) were provided in the Work Plan and have been used in interpreting the ecological impact of these structures.

Methods

The survey involved sixteen stations on the following six streams, selected cooperatively with SCS personnel in regard to the sites of the proposed structures.

Cross Creek
South Fork
Tributary of South Fork
Middle Fork
North Fork
Tributary of North Fork

APPENDIX D

At each of the 16 stations, a fish diversity and a bottom diversity study was done and a water sample analyzed for pH, alkalinity, acidity, sulfate, dissolved oxygen, and conductivity.

Fish Diversity. Approximately 100 yards of stream was electrofished at each station, sampling all available microhabitats until no new species were found. A representative sample of the fishes was preserved, identified to species, and their relative abundance was noted. In the case of important game species, particular attention was paid to collect and identify young-of-the-year individuals since this is a valuable indicator of the year-round suitability of the environment for natural populations.

Bottom Fauna Diversity. Representative microhabitats were sampled qualitatively at each of the 16 stations until no new species were found in the field sorting. All invertebrates collected were preserved and later identified in the laboratory. Most identifications were made only to the family level because of the technical problems with some groups. However, in the case of many families, identification to the generic level was made when these were known to be accurate. After all invertebrates were identified, they were listed in three classes of tolerance to pollution, and assigned values of 0, 1, or 2 in increasing order of sensitivity. The biotic index, proposed by Beck (1955), was then calculated for each station for comparison between stations and between streams.

In the calculation of Beck's diversity index, those insects that are highly sensitive to low oxygen are given added weight in the index, and high index values thus reflect both a large number of different organisms and a preponderance of those organisms which are good indicator species. A stream with a good diversity of mayflies, stoneflies and caddisflies (most of which are sensitive to low oxygen) would have a higher diversity index than another stream with many different kinds of snails, worms, and midges (most of which are tolerant to low oxygen). Values below 10 would indicate that a stream is somewhat polluted with organic wastes; clean streams have diversity index values ranging from about 30 to more than 50.

Water Quality. A water sample was taken at each station and saved for analysis in the laboratory. Experience has indicated that values of pH, alkalinity, acidity, conductivity, and sulfate, as determined in the field differ very little from those determined from samples analyzed in the laboratory within a few days. Analyses for alkalinity and acidity followed Standard Methods for the Examination of Water and Wastewater, titrating with standard acid or hydroxide using phenolphthalein and methyl orange as indicators. A sulfate analysis was made with the turbidimetric method outlined in the Hach Direct Reading-Engineer's Laboratory. Conductivity was measured with a Hach Conductivity Meter

in micromhos per centimeter. The pH was measured electrometrically with a Corning Model 7 meter.

Dissolved oxygen was determined in the field at each of the stations. Two samples were taken to approximate the high and the low points in the diurnal curve; these were taken between the hours of midnight and 0200 hours for the low value, and between 1400 and 1600 hours for the high value. In addition, for the three stations on Cross Creek above and below Avella, samples for dissolved oxygen were taken at 2-hour intervals for a 24-hour period to establish the limits of the diurnal curve. The Winkler Method with the azide modification was used to fix the oxygen; titration was done with sodium thiosulfate using starch as the end point indicator.

General Considerations

Water Quality. The water in all of the headwater streams of Cross Creek is well buffered, varying in alkalinity from 157 to 232 ppm. Analyses for pH, acidity and conductivity are consistent with these high alkalinity values (Table 3) and one can predict that biological productivity will be high in such water. The high alkalinity also is a fortuitous safeguard against acid-pollution from coal mining operations in this area. Analyses from the main stream below Avella (higher sulfate, higher conductivity and lower alkalinity than in other stations) indicate that a considerable amount of acid drainage is being neutralized without immediate harm or danger to the aquatic ecosystem. The geological occurrence of coal deposits within watersheds producing alkaline waters, such as is the case in the Cross Creek Watershed, is rather unique in Pennsylvania. Coal deposits are more often found in this state where the alkalinity of the water is less than 20 ppm and acid drainage from such areas usually proves to be disastrous to aquatic organisms.

The values for pH all fall within the normal, unpolluted range of 6.5 to 8.5 and vary somewhat with the intensity of photosynthesis. The conductivity readings and sulfate values are higher than in most streams in southwestern Pennsylvania, but indicate an excellent level of mineral fertility for growing aquatic plants and animals. One prediction that can be safely made is that impoundments on such waters are likely to have abundant growths of aquatic plants, possibly to the nuisance stage for swimming, boating, or fishing.

The diurnal range of dissolved oxygen in these streams is also quite wide indicating high primary productivity and corroborating the water quality data. The most extreme case noted was in the South Fork (Station 13) where dissolved oxygen fluctuated from 76% to 141% saturation in a 24-hour period. It should be pointed out, however, that all dissolved oxygen values were well within the safe range for warmwater fishes; none were recorded below 5.9 ppm (Table 4).

The intensive study of diurnal fluctuation in dissolved oxygen above and below Avella (Table 5) detected no organic pollution coming from Avella in excess of what the stream can easily assimilate. Oxygen values 2 miles downstream from Avella remained in the excellent range of 8.0 to 9.8 ppm over a 24-hour period.

Benthic Diversity. The invertebrates found in Cross Creek and its tributaries are typical of unpolluted streams in Pennsylvania (Table 6) but the diversity is not as high as might be expected (Table 7). For example, at 11 of the 16 stations in Cross Creek the diversity index was less than 20. By comparison, clear unpolluted streams in Pennsylvania are more likely to have diversity indices ranging from 30 to 50.

One explanation for such low diversity in Cross Creek and its tributaries is the high turbidity observed in these streams. No direct measurements of turbidity were made, but stream bottoms were almost always very silty and the water noticeably turbid.

The diversity index varies somewhat between stations, but the unusually high value found only at Cross Creek just below P.A.-661 dam site (Station 3) was due almost entirely to nine species of mayflies found at this station, in addition to the usual list of invertebrates. Mayflies, stoneflies, caddisflies and some others are sensitive to low oxygen, and heavy siltation, and the diversity index is more influenced by these organisms than by the presence of an equal number of species of snails, worms and midges.

Fish Diversity. There was an almost complete lack of game fishes present in the 16 stations electrofished in the Cross Creek Watershed. Smallmouth bass were present at two stations, largemouth bass were found at five stations, and other centrarchids were also not numerous (Table 9). No trout were found at any station. Most of the fish population in the Cross Creek Watershed is made up of minnows, suckers and darters (Table 10).

The turbid nature of most Cross Creek tributaries also contributes to the rather sparse diversity, although the density of the fish population is rather high. The greatest number of species found at any station was 16, the lowest number was 7, and the entire list of species found anywhere in the Cross Creek drainage numbered only 26 species. By comparison, 43 different species were taken in the Oil Creek drainage and more than 20 species were taken at several stations. One earlier collection was taken from Cross Creek near the West Virginia border in 1968, but this collection contained no species different from those taken in the present study (Table 9).

None of the rare or endangered fishes in Pennsylvania were found in the Cross Creek drainage. To the contrary, most of the species

found are both widespread and locally abundant. A few species, such as the river chub, redside dace, silverjaw minnow and the sand shiner have a restricted distribution, but they could in no way be considered endangered species.

Description of Stations

The following descriptions are organized on a watershed basis as outlined in Table 1.

Cross Creek Station 1. This station was selected about 2 miles downstream from Avella at the Meadowcroft Picnic and Parking Site. The stream here is 20 to 30 feet wide with no pools deeper than 18 inches. A short distance upstream there is a large deep pool used for swimming, but this pool was not sampled. The stream bottom is mostly flat stones and gravel with a few large stone blocks three to five feet in diameter. The bottom materials were covered with silt and algae. The stream here flows through a deep valley with several exposed sandstone cliffs. The valley bottom is forested almost completely with sycamore, black locust, tulip poplar, willow and dead and dying elm trees. Old inactive coal mine dumps are common immediately upstream from this site.

Cross Creek Station 2. This station was selected about a half mile upstream from Avella near the Ruschell Mine at Donohoe Bridge No. 17. The stream here is 10 to 40 feet wide, meandering in a flood channel along Pa. Route 50 and the railroad tracks. The stream banks are brushy with a few scattered maples, black cherry and dead elms. The bottom materials are mostly slate and shale overlain with fine silt. The water was noticeably turbid with fine clay. There are several pools three to four feet deep full of white suckers, stonerollers, hog suckers and carp. There is a large coal refuse pile and cattail marsh alongside the stream, from which a small untreated sewage effluent flows from a cement pipe and enters Cross Creek about 100 yards downstream from the bridge.

Cross Creek Station 3. This station was selected about half way between the junction of the South Fork and the dam site for P.A.-661 structure. The stream here is 10 to 15 feet wide with pools up to four feet deep. The bottom materials are mostly shale and flat sandstones covered with silt. The stream has eroded through clay banks and occupied about half of the entire stream bed. The stream banks were mostly wooded with sycamore, black cherry and willows. There is a large marshy area just downstream from this site.

Cross Creek Station 4. This station was selected within the impoundment area of P.A.-661 at a cement bridge. The stream here is 5 to 20 feet wide with only an occasional pool wider than 10 feet. Stream flow was estimated to be less than 5 cfs. The bottom materials

were mostly gravel and rubble in the few riffle areas, but soft silt in the pools. The stream banks were brushy with willow, black locust, sycamore and black cherry. The valley area is under cultivation with corn and pasture, but no grazing was noted in the immediate area.

Cross Creek Station 5. This station was selected just below the junction of the two main headwater tributaries above the flood pool of P.A.-661 structure. The stream here is 5 to 20 feet wide with numerous pools up to 2 feet deep, flowing less than 5 cfs. The bottom materials were mostly flat rubble with much silt. The stream banks were of eroding clay, heavily shaded with willow brush. The valley here is under cultivation with corn and hay. No grazing was noted in the immediate area, but there is a large amount of grazed pasturage upstream from this site.

South Fork, Station 13. This station was selected about 1 mile downstream from the mouth of the tributary stream draining P.A.-662 impoundment. The stream here is 10 to 15 feet wide with pools up to 18 inches deep. The stream flow was estimated to be less than 3 cfs. The bottom materials are mostly limestone bedrock, with some riffle gravel. Pools and riffles are covered with thick layer of silt. Stream banks are vegetated only with grasses and forbs with some erosion of clay banks. The stream valley is open, cultivated with corn and pasture with a few trees only on the hilly portions of the watershed.

South Fork, Station 16. This station was selected about 1 mile upstream from mouth of the tributary draining P.A.-662 impoundment, and thus would have no effect on this structure except to modify its effect on the stream below. The stream here is 5 to 10 feet wide with pools up to 2 feet deep. The stream flow was estimated to be less than 2 cfs. The bottom materials are mixed gravel, flat rubble and boulders covered with a thick layer of silt. The stream banks are badly eroded with layers of exposed clay. There is no streamside vegetation except for one large willow tree. The stream meanders through heavily grazed pasture in a wide valley with mixed hardwood woodlots and corn fields.

Tributary to South Fork, Station 14. This station was selected within the impoundment of P.A.-662. The stream here is 3 to 20 feet wide, with only an occasional pool wider than 6 feet. The stream depth averages about 18 inches with a few pools up to 4 feet deep. The flow was judged to be between 1 and 2 cfs. The stream has many oxbows, meanders, and is very sluggish and silty. In the few riffles, the bottom is of sand and gravel. The stream flows through a mowed meadow with steep eroding clay banks three to six feet high. The stream bank vegetation is sparse, mostly willows and forbs. There are few hardwoods along the steeper part of the valley.

Tributary to South Fork, Station 15. This station was selected above the impoundment area of P.A.-662, just below the junction of two headwater branches of this tributary. The stream here is 3 to 10 feet wide with pools up to 2 feet deep. The stream flow is approximately 1 cfs. The bottom materials in the few riffles are small boulders, flat stones and some gravel. The pools are extremely muddy. The stream banks are eroding clay, broken down by dairy cows, with only a few forbs for cover. The stream flows through open pasture with a marshy area upstream. The valley is open, with the tops of hills forested with mixed hardwoods.

Middle Fork, Station 6. This station was selected at the first bridge upstream from Avella about one half mile below the junction of the Middle Fork and the North Fork. The stream here is 10 to 30 feet wide with some pools as deep as 4 feet. The bottom is mostly bedrock and shale. Stream side is forested with wild cherry, sycamore, tulip poplar, elm, black locust, willows and aspen. A small tributary of acid water (pH 3.1, 309 ppm acidity, 2700 ppm sulfate) enters the stream but is quickly neutralized by the highly buffered stream water and appears to have almost no effect on the biota.

Middle Fork, Station 11. This station was selected within the impoundment area of P.A.-660 about 1 mile upstream from the mouth of the North Fork. The stream here is about 5 to 10 feet wide with pools up to 18 inches deep. The bottom is shale and medium rubble covered with silt. The stream banks are eroding clay up to 5 feet high. Very little streamside vegetation was observed in the pastured area of this station. The stream is very sluggish and muddy. The valley is cultivated in corn and pasture.

Middle Fork, Station 12. This station was selected in the headwaters on Zimmerman's farm lane upstream from the Chechuck property. The stream here is 3 to 5 feet wide with pools up to 12 inches deep flowing less than 1 cfs. The stream flows through moderately grazed pasture with eroding clay banks 6 to 12 feet high. The bottom is mostly flat stones covered with silt; there are deep deposits of silt in the pools. The valley is 100 to 300 yards wide with almost no trees or brush except where the stream flows along side of a hill. Here the trees are mixed hardwoods such as black walnut, maples, elm and oaks.

North Fork, Station 7. This station was selected at the first bridge upstream from Studa. The stream here is 10 to 20 feet wide with a few pools up to 3 feet deep. The bottom is mostly mud, with a few stony riffles. The water was extremely turbid, even after several days of no rain. There are several large coal refuse banks along the stream in this area. The stream flows through a steep ravine with clay banks covered with willow brush. The stream resembles a sluggist drainage ditch with crayfish extremely abundant.

North Fork, Station 8. This station was selected about 2 miles upstream from Studa and about 1 mile upstream from the tributary of North Fork draining P.A.-659F. The stream here is 6 to 20 feet wide with a few holes up to 4 feet deep. The stream meanders through farm fields with not much cattle damage. Stream side vegetation is mixed grass, forbs and willow brush. Bottom of stream is mostly shale and very silty.

Tributary to North Fork, Station 9. This station was selected in the impoundment area of P.A.-659F about 1.5 miles northeast of Studa. The stream here is 2 to 4 feet wide with pools up to 12 inches deep, flowing less than 2 cfs. The bottom is small gravel and stones, very silty in the pools. The stream flows through lightly grazed pasture with some break down of high clay banks by cattle. Large trees are scarce with an occasional wild cherry, willow, oak, maple or ash. Streamside vegetation is largely blackberry and thornapple. Watershed above site is used for cattle grazing and cultivated crops. Stream is too small for significant fishery value.

Tributary to North Fork, Station 10. This station was selected in the extreme headwaters about half a mile upstream from P.A.-659F, and about 1 mile west of the village of Cross Creek. The stream here is 2 to 4 feet wide with pools up to 12 inches deep. The bottom is small gravel and rocks in the riffles, very muddy and silty in pools. The stream flows through a wide valley largely in pasture. The immediate stream banks are lightly grazed with some damage by cows. No brush or trees grow on the banks, but there are a few scattered stands of black locust and a few solitary oaks and elms in the pasture. The stream is too small for a significant fishery.

General Summary

Judged in its entirety, the Cross Creek Watershed Work Plan should prove to be beneficial to the aquatic ecosystem with no appreciable damage to existing aquatic resources. There are almost no game fishes present in this watershed now with the minor exception of a few largemouth bass and smallmouth bass in the deeper pools of the larger tributaries. No trout were collected. The main stream of Cross Creek in the vicinity of Avella possibly could be used for put-and-take trout stocking for short periods in spring and fall, but the stream is too warm and too turbid to expect natural populations of trout.

The large permanent pool planned for P.A.-661 on the main branch of Cross Creek should prove to be a highly productive fishery for largemouth bass, channel catfish and bluegills. The high fertility may cause problems with excessive aquatic plants, but these may be minimized with proper construction of the reservoir to avoid excessive areas of shallow water.

Damage to the watershed by erosion during the construction phase can be severe in this watershed because of the fragile nature of the soils. The turbidity in these streams is already excessive from a fishery standpoint due to the amount of cultivation and pasturing now practiced. Rigorous precautions should be taken to avoid removing any vegetative cover except where absolutely necessary during the construction phase of this project.

The three smaller structures planned for the Cross Creek Watershed (P.A.-659F, P.A.-660, and P.A.-662) have limited potential for development of warm-water fisheries, but these should not be ignored. Small lakes of 5 to 10 acres are easier to manage from a fishery standpoint and a worthwhile fishery could be maintained in these ponds.

Report prepared by Edwin L. Cooper,

APPENDIX D

Table 1. Location of sampling stations for survey of Cross Creek. Refer to Figure 1 for exact locations.

Cross Creek
- Station 1, 2 miles west of Avella
- Station 2, 1 mile southeast of Avella
- Station 3, 0.5 mile above junction with South Fork
- Station 4, 1 mile upstream from P.A.-661 dam
- Station 5, 1.5 miles upstream from flood pool of P.A.-661

South Fork
- Station 13, 1 mile downstream from bridge on LR 62035
- Station 16, 1 mile upstream from bridge on LR 62035

Tributary to South Fork
- Station 14, just upstream from P.A.-662 dam
- Station 15, 0.5 mile upstream from flood pool of P.A.-662

Middle Fork
- Station 6, 0.5 mile northeast of Avella
- Station 11, just upstream from P.A.-660 dam
- Station 12, 2 miles upstream from flood pool of P.A.-660

North Fork
- Station 7, 1.5 miles upstream from junction with Middle Fork
- Station 8, 1 mile upstream from junction with tributary to North Fork

Tributary to North Fork
- Station 9, just upstream from P.A.-659F dam
- Station 10, 1 mile upstream from flood pool of P.A.-659F

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Table 2. Proposed designs of structures in Cross Creek Watershed. Information obtained from July 1971 Watershed Work Plan and from John Simon, Harrisburg office of SCS.

Item	Site			
	PA 659F	PA 660	PA 661	PA 662
Permanent pool elevation	1024.0	981.0	1026.0	1048.0
Permanent pool area (acres)	5	8	258	8
Flood pool elevation	1045.5	1017.0	1033.0	1072.5
Flood pool area (acres)	27	57	311	52
Maximum depth of permanent pool (feet)	8.2	13.4	56.4	11.0
Average depth of permanent pool (feet) 25% of area	6.2	11.0	47.5	8.5
Average depth of permanent pool (feet) 50% of area	5.2	8.5	37.4	6.0
Area to be cleared (acres)	2	1	50	5
Length of stream to be affected (feet)	1100	1800	16600	2100

APPENDIX D

Table 3. Selected analyses of water quality at each of 16 stations in Cross Creek Watershed during August 1972.

Stations	pH	Alkalinity (ppm)	Acidity (ppm)	Sulfate (ppm)	Conductivity (mhos X 10^6)
Cross Creek					
Station 1	8.2	115	5	300	1010
Station 2	8.1	172	8	90	525
Station 3	7.6	175	9	58	450
Station 4	7.6	173	5	47	440
Station 5	7.6	180	10	45	445
South Fork					
Station 13	7.7	178	4	45	475
Station 16	7.4	178	10	50	460
Tributary to South Fork					
Station 14	7.8	174	4	43	425
Station 15	7.6	188	5	44	450
Middle Fork					
Station 6	7.6	157	5	55	800
Station 11	7.8	217	4	50	510
Station 12	7.4	232	5	49	540
North Fork					
Station 7	8.1	218	5	55	520
Station 8	7.8	220	8	48	460
Tributary to North Fork					
Station 9	7.8	190	8	98	545
Station 10	7.7	192	8	45	475

APPENDIX D

Table 4. Analysis of dissolved oxygen at each of 13 stations in Cross Creek Watershed during August 1972. Refer to additional table for 24-hour diurnal variation in dissolved oxygen at Stations 1, 2, and 3.

Station	Date	Time	Air Temp. (F)	Water Temp. (F)	Dissolved oxygen ppm	% sat.
Cross Creek						
4	21 Aug	1540	74	75	9.6	117
4	22 Aug	0145	60	68	6.7	76
5	21 Aug	1525	74	78	7.8	99
5	22 Aug	0125	58	68	5.9	67
South Fork						
13	21 Aug	1445	80	80	11.0	141
13	22 Aug	0045	60	70	6.6	76
16	21 Aug	1500	80	80	9.7	124
16	22 Aug	0105	59	69	6.2	71
Tributary to South Fork						
14	21 Aug	1425	83	74	10.1	120
14	22 Aug	0030	58	68	7.0	80
15	21 Aug	1415	83	75	9.3	113
15	22 Aug	0020	59	66	6.8	76
Middle Fork						
6	21 Aug	1425	74	70	9.5	109
6	22 Aug	0105	60	67	8.5	94
11	21 Aug	1500	82	77	8.9	110
11	22 Aug	0040	60	70	7.1	82
12	21 Aug	1400	81	74	8.0	95
12	22 Aug	0010	62	64	8.2	89
North Fork						
7	21 Aug	1440	77	70	10.0	115
7	22 Aug	0050	59	70	5.9	68
8	16 Aug	1500	72	73	9.9	118
8	17 Aug	0045	70	70	7.0	80

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Table 4 continued.

Station	Date	Time	Air Temp. (F)	Water Temp. (F)	Dissolved oxygen ppm	Dissolved oxygen % sat.
Tributary to North Fork						
9	16 Aug	1445	72	72	10.2	120
9	17 Aug	0030	73	68	7.5	85
10	16 Aug	1430	81	74	9.5	113
10	17 Aug	0005	72	68	8.0	91

Table 5. Diurnal variation in dissolved oxygen (ppm) and temperature (F) at three stations on Cross Creek (Stations 1, 2, and 3) above and below Avella from 0900 hours 16 August to 0740 hours 17 August 1972.

Time	Air Temp.	Water Temp.	Dissolved oxygen ppm	Dissolved oxygen % sat.
	Station 3			
0900	62	62	8.6	91
1100	70	64	9.5	103
1300	74	68	9.7	110
1500	80	72	10.0	118
1700	79	73	9.3	111
1900	72	72	8.5	100
2100	67	72	7.6	89
2300	67	70	7.4	85
0100	69	70	7.4	85
0300	70	70	7.4	85
0500	69	69	7.3	84
0700	68	69	7.3	84
	Station 2			
0915	64	65	7.9	86
1115	72	68	8.5	97
1315	74	69	9.4	108
1525	82	75	9.9	121
1715	79	76	8.8	107
1915	72	75	8.5	104
2120	69	72	7.5	88
2320	68	70	6.9	79
0115	69	70	6.7	77
0325	71	70	6.9	79
0520	72	69	7.0	80
0725	69	69	7.3	84
	Station 1			
0935	64	64	9.3	101
1135	73	68	9.6	109
1330	75	69	9.8	113
1540	80	74	9.3	111
1735	78	77	8.4	104
1935	70	73	8.7	104
2140	68	71	8.0	94
2340	67	70	8.4	97
0140	70	70	8.2	94
0340	71	69	8.5	98
0535	70	69	8.3	95
0740	70	69	8.4	97

Table 6. Benthic invertebrates collected at each of 16 stations in Cross Creek Watershed during August 1972. Numerals refer to number of species.

Taxa	Stations								
	Cross Creek					South Fork			
	1	2	3	4	5	13	16	14	15
Platyhelminthes									
Turbellaria									
Planariidae sp.							1		
Annelida									
Oligochaeta									
Lumbriculidae sp.									
Tubificidae sp.								1	
Arthropoda									
Crustacea									
Isopoda									
Asellidae sp.									
Amphipoda									
Gammaridae sp.						1			
Decapoda									
Astacidae									
Orconectes sp.	1			1	1	1	1	1	1
Cambarus sp.		1	1						
Insecta									
Plecoptera									
Perlidae									
Acroneuria sp.	1		1	1	1	1		1	
Ephemeroptera									
Ephemeridae									
Hexagenia sp.				1				1	
Heptageniidae sp.				1		1			
Stenonema sp.		1	3	1	1	1	2	1	2
Baetidae									
Baetis sp.	1	1	4	1	1	1	1	1	1
Isonychia sp.		1	1		1	1			1
Leptophlebiidae									
Paraleptophlebia sp.									
Ephemerellidae									
Ephemerella sp.	1		1	1					1
Odonata									
Anisoptera									
Aeschnidae sp.		1	1	1		1			
Zygoptera									
Agrionidae sp.								1	
Calopterygidae sp.			1		1				

continued on next page

Table 6 continued.

Taxa	Stations								
	Cross Creek					South Fork			
	1	2	3	4	5	13	16	14	15
Megaloptera									
Sialidae sp.		1	1					1	
Corydalidae sp.									
Corydalus sp.	1	1							
Trichoptera									
Philopotamidae sp.					1				
Helicopsyche sp.									
Hydropsychidae									
Cheumatopsyche sp.	1	1	1		1	1	1		1
Hydropsyche sp.	1	1	1	1	1	1	1		1
Coleoptera sp.			1						
Haliplidae sp.					1				
Elmidae sp.	1	1	1	1	1	1	1		1
Psephenidae									
Psephenus sp.		1	1	1	1				1
Diptera									
Tipulidae sp.		1							
Simuliidae sp.		1	1	1	1	1	1		1
Chironomidae sp.			2	1	2	1	2	1	1
Stratiomyidae sp.			1		1				
Ceratopogonidae sp.									
Tabanidae sp.				1	1	1		1	1
Rhagionidae									
Atherix variegata	1	1	1						
Culicidae sp.								1	
Mollusca									
Gastropoda									
Planorbidae sp.								1	
Physidae									
Physa sp.			1	1	1	1	1	1	1
Lymnaeidae sp.									
Pelecypoda sp.				1					
Sphaeriidae sp.			1	1	1	1	1	1	
Beck's Diversity Index	13	17	35	22	21	21	15	16	16

continued on next page

Table 6. Benthic invertebrates collected at each of 16 stations in Cross Creek Watershed during August 1972. Numerals refer to number of species.

Taxa	Stations						
	Middle Fork			North Fork			
	6	11	12	7	8	9	10
Platyhelminthes							
Turbellaria							
Planariidae sp.		1					
Annelida							
Oligochaeta							
Lumbriculidae sp.		1	1				
Tubificidae sp.							
Arthropoda							
Crustacea							
Isopoda							
Asellidae sp.				1			1
Amphipoda							
Gammaridae sp.			1			1	1
Decapoda							
Astacidae							
Orconectes sp.	1	1	1	1	1		1
Cambarus sp.							
Insecta							
Plecoptera							
Perlidae							
Acroneuria sp.			1				1
Ephemeroptera							
Ephemeridae							
Hexagenia sp.							
Heptageniidae sp.							
Stenonema sp.		1	1	2	1		1
Baetidae							
Baetis sp.	1	2	1	1	2	2	2
Isonychia sp.	1						
Leptophlebiidae							
Paraleptophlebia sp.			1				
Ephemerellidae							
Ephemerella sp.	1						
Odonata							
Anisoptera							
Aeschnidae sp.						1	
Zygoptera							
Agrionidae sp.							
Calopterygidae sp.							1

continued on next page

Table 6 continued.

Taxa	Stations						
	Middle Fork			North Fork			
	6	11	12	7	8	9	10
Megaloptera							
Sialidae sp.							
Corydalidae sp.					1	1	
Corydalus sp.							
Trichoptera							
Philopotamidae sp.						1	
Helicopsyche sp.					1		
Hydropsychidae							
Cheumatopsyche sp.	1	1	1	1	1	1	1
Hydropsyche sp.	1	1	1		1	1	1
Coleoptera sp.							
Haliplidae sp.				1			
Elmidae sp.	1	1	1	1	1	1	1
Psephenidae							
Psephenus sp.		1				1	
Diptera							
Tipulidae sp.		1					
Simuliidae sp.		1			1		
Chironomidae sp.	1	2	1	1	2	2	1
Stratiomyidae sp.							1
Ceratopogonidae sp.		1					
Tabanidae sp.						1	
Rhagionidae							
Atherix variegata	1	1			1	1	
Culicidae sp.							
Mollusca							
Gastropoda							
Planorbidae sp.							
Physidae							
Physa sp.		1	1	1	1	1	1
Lymnaeidae sp.					1		
Pelecypoda sp.		1					
Sphaeriidae sp.	1				1		
Beck's Diversity Index	14	16	15	12	20	16	19

End of table.

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Table 7. Diversity index (Beck, 1955) of benthic invertebrates collected at each of 16 stations in Cross Creek Watershed during August 1972. The index number is the sum of each species times its sensitivity value for each station. Sensitivity values given in Table 8.

Station	Diversity index
Cross Creek	
Station 1	13
2	17
3	35
4	22
5	21
South Fork	
Station 13	21
16	15
Tributary to South Fork	
Station 14	16
15	16
Middle Fork	
Station 6	14
11	16
12	15
North Fork	
Station 7	12
8	20
Tributary to North Fork	
Station 9	16
10	19

APPENDIX D

Table 8. Sensitivity values for organic pollution used to calculate Beck's Diversity Index. Tolerant = 0, Moderately sensitive = 1, Sensitive = 2.

Tolerant	Moderately sensitive	Sensitive
Planariidae	Odonata	Isopoda
Annelida	Hydropsychidae	Amphipoda
Coleoptera	Simuliidae	Astacidae
Tipulidae	Chironomidae	Plecoptera
Ceratopogonidae	Stratiomyidae	Ephemeroptera
Tabanidae	Rhagionidae	Megaloptera
Culicidae		Trichoptera (most)
Gastropoda		Pelecypoda

References:

Beck, W. M. 1954. Studies in stream pollution biology. I. A simplified ecological classification of organisms. Quarterly J. Florida Acad. Sci. 17(4):211-227.

Beck, W. M. 1955. Suggested method for reporting biotic data. Sewage and Industrial Wastes 27(10):1193-1197.

Keup, L., W. Ingram, and K. Mackenthun. 1966. The role of bottom-dwelling macrofauna in pollution investigations. Public Health Service Publ. No. 999-WP-38, 23 p.

APPENDIX D

Table 9. Fishes collected at each of 16 stations on Cross Creek Watershed during August 1972. Relative abundance indicated by symbols: A = abundant, C = common, U = uncommon.

Common name	Stations								
	Cross Creek					South Fork			
	1	2	3	4	5	13	16	14	15
Cyprinidae									
Stoneroller	A	A	U	A	U	C	C	C	A
Redside dace									
Carp		U							
Silverjaw minnow	U			U		U			U
River chub	U								
Emerald shiner	A	C							
Striped shiner	A	C	C	U		C	U	A	
Rosyface shiner	U								
Sand shiner	U								
Bluntnose minnow	A	A	A	A	A	A	A	A	A
Fathead minnow				U					
Blacknose dace	A			U					U
Creek chub	C	C	A	A	A	U	A	C	A
Catostomidae									
White sucker	C	U	C	A	C	U	A	C	C
Northern hog sucker	C	C	U			C		C	U
Centrarchidae									
Rock bass		U							
Green sunfish		U	A	U	U				
Pumpkinseed			U	U				A	C
Bluegill				U				U	
Smallmouth bass						C		U	
Largemouth bass		U	U			U		U	U
Percidae									
Greenside darter	C	A		U	U	C	U	U	U
Rainbow darter	C	U		U		U			
Fantail darter	U	A	C	A	A	C	A	C	C
Johnny darter	C	C	A	A	A	A	A	A	A
Cottidae									
Mottled sculpin									
Total number of species	16	15	11	15	8	13	8	13	12

continued on next page

Table 9 continued.

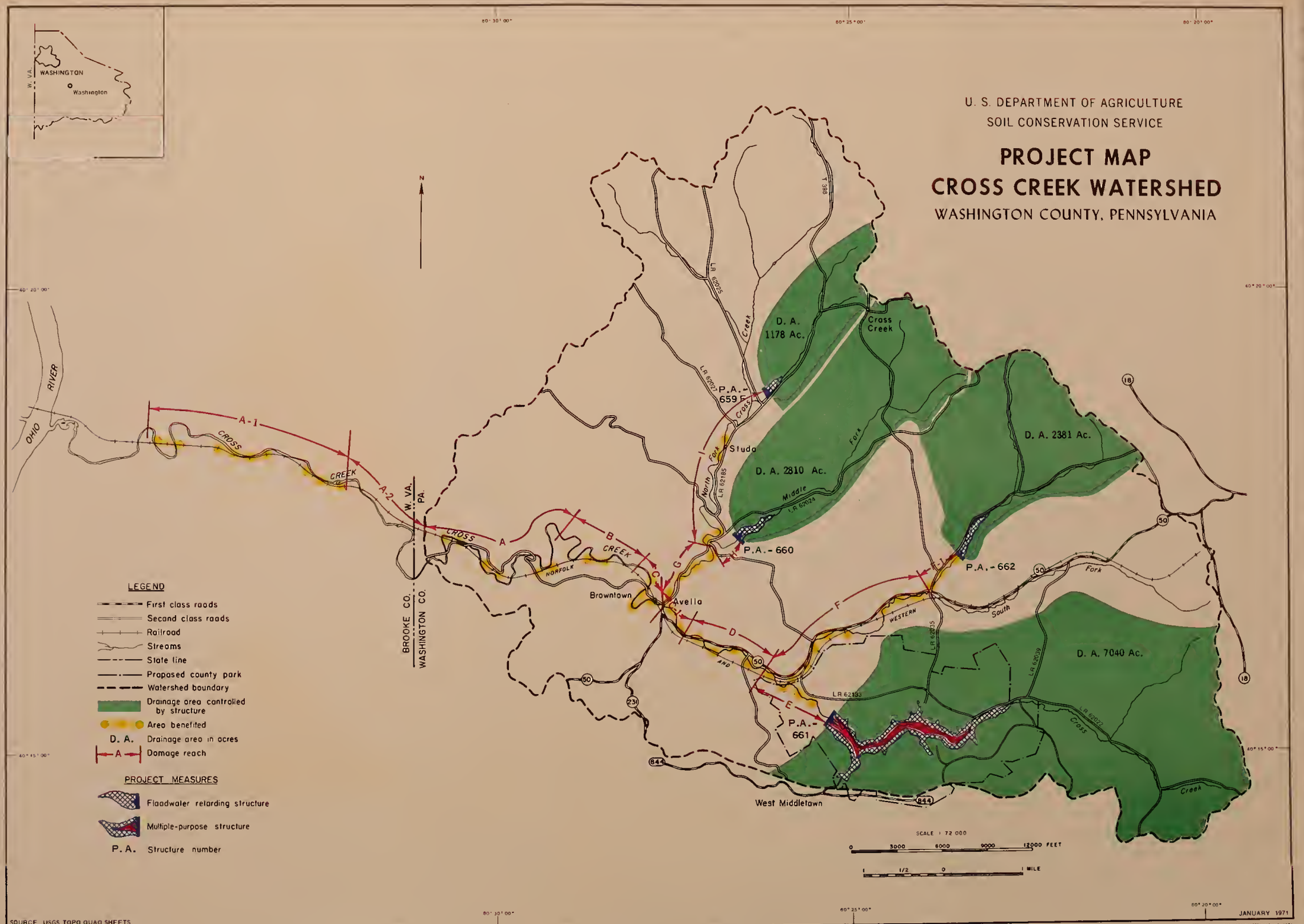
Common name	Stations: Middle Fork 6	Middle Fork 11	Middle Fork 12	North Fork 7	North Fork 8	North Fork 9	North Fork 10	1968*
Cyprinidae								
Stoneroller	A	A	C	U	A		C	A
Redside dace	C				U			
Carp								
Silverjaw minnow	C				U			U
River chub								U
Emerald shiner	A							
Striped shiner	A			U				C
Rosyface shiner								
Sand shiner								U
Bluntnose minnow	A	C	C	U	A	C	A	A
Fathead minnow				U	U			
Blacknose dace	A	A	A	U	C	A	C	U
Creek chub	A	A	A	A	A	A	A	C
Catostomidae								
White sucker	U	U	U	A	C	C	U	
Northern hog sucker	U							C
Centrarchidae								
Rock bass								
Green sunfish								
Pumpkinseed				U	C		U	U
Bluegill								
Smallmouth bass								
Largemouth bass								
Percidae								
Greenside darter								C
Rainbow darter	U							U
Fantail darter	C	A	C	U	C	U	C	C
Johnny darter	C	U	U	A	A	C	C	A
Cottidae								
Mottled sculpin			A	U	A	A	C	C
Total number of species	13	7	8	11	12	7	9	15

*This collection was taken in Cross Creek near the West Virginia border by electrofishing on 16 July 1968.

APPENDIX D

Table 10. List of scientific and common names of fishes collected in Cross Creek Watershed during August 1972. Common names follow the list recommended by the American Fisheries Society Special Publication No. 6, 1970.

Scientific name	Common name
Cyprinidae	
Campostoma anomalum	Stoneroller
Clinostomus elongatus	Redside dace
Cyprinus carpio	Carp
Ericymba buccata	Silverjaw minnow
Nocomis micropogon	River chub
Notropis atherinoides	Emerald shiner
Notropis chrysocephalus	Striped shiner
Notropis rubellus	Rosyface shiner
Notropis stramineus	Sand shiner
Pimephales notatus	Bluntnose minnow
Pimephales promelas	Fathead minnow
Rhinichthys atratulus	Blacknose dace
Semotilus atromaculatus	Creek chub
Catostomidae	
Catostomus commersoni	White sucker
Hypentelium nigricans	Northern hog sucker
Centrarchidae	
Ambloplites rupestris	Rock bass
Lepomis cyanellus	Green sunfish
Lepomis gibbosus	Pumpkinseed
Lepomis macrochirus	Bluegill
Micropterus dolomieui	Smallmouth bass
Micropterus salmoides	Largemouth bass
Percidae	
Etheostoma blennioides	Greenside darter
Etheostoma caeruleum	Rainbow darter
Etheostoma flabellare	Fantail darter
Etheostoma nigrum	Johnny darter
Cottidae	
Cottus bairdi	Mottled sculpin


U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
PROJECT MAP
CROSS CREEK WATERSHED
WASHINGTON COUNTY, PENNSYLVANIA
W. VA.
WASHINGTON
Washington
N
OHIO RIVER
CROSS CREEK
A-1
A-2
A
B
C
D
E
F
G
W. VA.
PA.
BROOKE CO.
WASHINGTON CO.
NORFOLK AND WESTERN
Brownstown
Avella
Studa
West Middletown
North Fork
Middle Fork
South Fork
Cross Creek
LR 62027
LR 62025
LR 62185
LR 62124
LR 62135
LR 62133
LR 62039
LR 62037
T 396
D. A. 1178 Ac.
D. A. 2810 Ac.
D. A. 2381 Ac.
D. A. 7040 Ac.
P.A.-659
P.A.-660
P.A.-661
P.A.-662
LEGEND
First class roads
Second class roads
Railroad
Streams
State line
Proposed county park
Watershed boundary
Drainage area controlled by structure
Area benefited
D. A. Drainage area in acres
A Damage reach
PROJECT MEASURES
Floodwater retarding structure
Multiple-purpose structure
P. A. Structure number
SCALE 1 72 000
0 3000 6000 9000 12000 FEET
1/2 0 1 MILE
SOURCE USGS TOPO QUAD SHEETS
JANUARY 1971